

<b>SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS</b> OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, AND 30				1. REQUISITION NUMBER W68MD9-5270-6339-0001		PAGE 1 OF 11	
2. CONTRACT NO. W912DW-06-P-0008		3. AWARD/EFFECTIVE DATE 18-Oct-2005		4. ORDER NUMBER		5. SOLICITATION NUMBER W912DW-05-Q-0180	
7. FOR SOLICITATION INFORMATION CALL:		a. NAME SCOTT W BRITT				b. TELEPHONE NUMBER (No Collect Calls) 206-764-3517	
9. ISSUED BY USA ENGINEER DISTRICT, SEATTLE ATTN: CENWS-CT 4735 EAST MARGINAL WAY SOUTH SEATTLE WA 98134-2329  TEL: 206-764-3772 FAX: 206-764-6817		CODE W912DW		10. THIS ACQUISITION IS <input checked="" type="checkbox"/> UNRESTRICTED <input type="checkbox"/> SET ASIDE: % FOR <input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> HUBZONE SMALL BUSINESS <input type="checkbox"/> 8(A)  NAICS: SIZE STANDARD:		11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input type="checkbox"/> SEE SCHEDULE  13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)  13b. RATING  14. METHOD OF SOLICITATION <input checked="" type="checkbox"/> RFQ <input type="checkbox"/> IFB <input type="checkbox"/> RFP	
15. DELIVER TO SEE SCHEDULE FOR FURTHER INFORMATION. US ARMY CORPS OF ENGRS SEATTLE WA 98124-3755		CODE SEE SCH		16. ADMINISTERED BY  <b>SEE ITEM 9</b>			
17a. CONTRACTOR/OFFEROR COLUMBIA HELICOPTERS, INC. ALLEN L. TRIVITT 14452 ARNDT RD NE AURORA OR 97002-2952  TEL. (503) 678-1222 EXT 453		CODE 7W206  FACILITY CODE		18a. PAYMENT WILL BE MADE BY US ARMY CORPS OF ENGRS FINANCE CENTER CEFC-AO-P 901-874-8556 5722 INTEGRITY DRIVE MILLINGTON TN 38054-5005			
<input type="checkbox"/> 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER		18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a. UNLESS BLOCK BELOW IS CHECKED <input type="checkbox"/> SEE ADDENDUM					
19. ITEM NO.	20. SCHEDULE OF SUPPLIES/ SERVICES			21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
<b>SEE SCHEDULE</b>							
25. ACCOUNTING AND APPROPRIATION DATA  <b>See Schedule</b>						26. TOTAL AWARD AMOUNT (For Govt. Use Only)  <b>\$88,500.00</b>	
<input type="checkbox"/> 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1. 52.212-4. FAR 52.212-3. 52.212-5 ARE ATTACHED. ADDENDA <input type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED <input checked="" type="checkbox"/> 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA <input checked="" type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED							
28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>0</u> COPIES <input type="checkbox"/> TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.				29. AWARD OF CONTRACT: REFERENCE <input checked="" type="checkbox"/> OFFER DATED <u>13-Oct-2005</u> . YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMSSEE SCHEDULE			
30a. SIGNATURE OF OFFEROR/CONTRACTOR				31a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER)		31c. DATE SIGNED	
				<i>Elaine M Ebert</i>		18-Oct-2005	
30b. NAME AND TITLE OF SIGNER (TYPE OR PRINT)		30c. DATE SIGNED		31b. NAME OF CONTRACTING OFFICER (TYPE OR PRINT)  ELAINE M EBERT / CONTRACTING OFFICER  TEL: (206) 764-3638 EMAIL: elaine.m.ebert@usace.army.mil			

**SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS  
(CONTINUED)**

PAGE 2 OF 11

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/ SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	<b>SEE SCHEDULE</b>				

32a. QUANTITY IN COLUMN 21 HAS BEEN

☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED: \_\_\_\_\_

32b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE		32c. DATE	32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE
32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE		32f. TELEPHONE NUMBER OF AUTHORIZED GOVERNMENT REPRESENTATIVE	
		32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE	

33. SHIP NUMBER	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR	36. PAYMENT <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL	37. CHECK NUMBER
<input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL				

38. S/R ACCOUNT NUMBER	39. S/R VOUCHER NUMBER	40. PAID BY

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		42a. RECEIVED BY ( <i>Print</i> )	
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER		41c. DATE	
		42b. RECEIVED AT ( <i>Location</i> )	
		42c. DATE REC'D (YY/MM/DD)	42d. TOTAL CONTAINERS

## Section SF 1449 - CONTINUATION SHEET

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002	HELICOPTER RENTAL FFP Project No.: 109582 Funding for Base Items 0001AA and 0001AB. See Schedule for details. PURCHASE REQUEST NUMBER: W68MD9-5270-6339-0001	1		\$88,500.00	\$88,500.00 NTE

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NET AMT	\$88,500.00
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ACRN AA Funded Amount	\$88,500.00
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FOB: Destination

## ACCOUNTING AND APPROPRIATION DATA

AA: 96X88620000 082433 32302J61DL007790 NA 96453  
 COST 000000000000  
 CODE:  
 AMOUNT: \$88,500.00

This award date of this order is the official Notice to Proceed date.

CF:  
 File  
 Contractor: Marci Abel [marcia@colheli.com]  
 Britt, Scott  
 Wright, David  
 Gonzalez, Sharon  
 Satter, Matthew  
 Pozarycki, Scott  
 Padilla, Michael C NWS

SCHEDULE

0001: Provide all materials, services, and equipment necessary to perform helicopter placement of LWD services in accordance with the Statement of Work, plans, drawing, and specifications.

BASE ITEMS:

0001AA: Mobilization to and from project site – single mobilization to and from project.

LS \$16,500

0001AB: All supplies, services, labor, and materials to operate a helicopter for one hour in accordance with the SOW:

EA \$8,000 x \*9 hours = \$72,000

OPTION ITEM

0001BB: All supplies, services, labor, and materials to operate a helicopter for one hour in accordance with the SOW:

EA \$8,000 x \*5 hours = \$40,000

\*All quantities approximate – invoice each hour of actual performance.



## STATEMENT OF WORK

### 1. GENERAL WORK DESCRIPTION:

This project requires placement of 86 pieces of large wood debris (LWD) by helicopter into 5 tributaries to Eagle Gorge Reservoir (Green River) behind the Howard Hanson Dam in King County Washington. The Government will provide necessary LWD at defined staging areas as indicated on the contract drawings. Consult drawings for additional detail regarding staging locations and LWD placement details. In many cases, the placement of LWD must be through existing canopy over stream.

### 2. PROJECT REQUIREMENTS:

#### 2.1. EQUIPMENT:

Project requires helicopter, operator, and equipment necessary to transport and place LWD from staging areas to identified stream locations. LWD is up to 30 inches in diameter and 50 feet long with attached rootball. Consult plans for additional details regarding LWD dimensions.

#### 2.2. PERIOD OF PERFORMANCE:

Performance period is after award (approximately 17 October 2005) and before 31 October 2005. Contractor may perform at any time within this period upon coordination with the project POC.

#### 2.3. LOCATION

Project site is the upper Green River watershed above Howard Hanson Dam, King County, Washington. Consult project drawings for geographic proximity of staging areas and stream placement locations.

#### 2.4. MOBILIZATION AND DEMOBILIZATION

Contractor price must include Mobilization and Demobilization to the project site in accordance with the price schedule. Several designated staging areas are suitable for refueling and overnight storage of equipment including helicopter. There will be cancellation of mobilization costs to and from the project allowed herein if the Contractor (or Agent) defaults on this agreement by leaving an assigned area prior to release, as agreed above, or by refusing to work as directed.

#### 2.5. SAFETY REQUIREMENTS: The Contractor shall operate all equipment in accordance with the requirements of EM 385-1-1, "Safety and Health Requirements Manual". This manual is part of all contracts, which include references to Federal Acquisition Regulation (FAR) Clause 52.236-13. The latest version and changes to EM 385-1-1 are available at [http://www.hq.usace.army.mil/soh/hqusace\\_soh.htm](http://www.hq.usace.army.mil/soh/hqusace_soh.htm). Contractors shall be responsible for complying with the current edition and all changes posted on the web as set forth in this solicitation.

#### 2.6. WORK FOR WATER QUALITY: Specifications have been included for water quality compliance for work in the Upper Green River Watershed. Not all requirements are necessarily applicable to work covered under this scope of work. Contractor is required to review the specifications and SWPPP for applicability. Corps will be responsible for water quality compliance at staging areas where LWD is located. Contractor is responsible for water quality compliance when it comes to helicopter operations, as well as helicopter staging and refueling areas.

### 3. HOURS OF OPERATION (WORK DAY): The contractor shall begin work at 0800 during normal Monday-Friday workweek. Workday will be approximately 8 hours.

4. **WORK WEEK:** For calculating payrolls, the workweek payment model is seven (7) consecutive days, beginning at 0001 hours Monday and ending at 2400 hours Sunday. This workweek shall remain fixed throughout the performance period of this contract.
5. **POINT OF CONTACT:** Project POC is David Wright (206) 406-4012.
6. **INSPECTION AND SUPERVISION:** Perform all work under the direction of the designated Contracting Officer's Representative (COR.)
7. **INVOICE AND PAYMENT:** Invoice payment address; block 18a - page 1 of the award SF 1449. Please send 1 copy of each invoice to the project POC (See paragraph 3). Payment is for actual quantities (See Schedule).

**Web Invoicing System (WInS)**

WInS is an optional online invoicing system providing Department of Defense vendors an electronic means of submitting invoices for payment. Vendor registration for WinS is through the following DFAS website: <https://ecweb.dfas.mil>. At the website, click on NEW Account to register and select "USACE" as the payment system name. The payment office code and location is "TO-UFC Millington". To establish an account in WInS, Central Contractor Registration (CCR) registration is necessary.

**ATTACHMENT:** See Plans, Drawings, and Specifications following the Schedule and Clauses.

(End of Statement of Work)

## CLAUSES INCORPORATED BY REFERENCE

52.204-7	Central Contractor Registration	OCT 2003
52.212-4	Contract Terms and Conditions--Commercial Items	OCT 2003
252.201-7000	Contracting Officer's Representative	DEC 1991
252.212-7001	Contract Terms and Conditions Required to Implement Statutes or Executive Orders Applicable to Defense Acquisitions of Commercial Items	SEP 2005

## CLAUSES INCORPORATED BY FULL TEXT

## 52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS--COMMERCIAL ITEMS (JUL 2005)

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

(1) 52.233-3, Protest After Award (AUG 1996) (31 U.S.C. 3553).

(2) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Pub. L. 108-77, 108-78).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items: (Contracting Officer check as appropriate.)

\_\_\_ (1) 52.203-6, Restrictions on Subcontractor Sales to the Government (JUL 1995), with Alternate I (OCT 1995) (41 U.S.C. 253g and 10 U.S.C. 2402).

\_\_\_ (2) 52.219-3, Notice of HUBZone Small Business Set-Aside (Jan 1999) (U.S.C. 657a).

\_\_\_ (3) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (JUL 2005) (if the offeror elects to waive the preference, it shall so indicate in its offer) (U.S.C. 657a).

\_\_\_ (4) (i) 52.219-5, Very Small Business Set-Aside (JUNE 2003) (Pub. L. 103-403, section 304, Small Business Reauthorization and Amendments Act of 1994).

\_\_\_ (ii) Alternate I (MAR 1999) to 52.219-5.

\_\_\_ (iii) Alternate II to (JUNE 2003) 52.219-5.

\_\_\_ (5) (i) 52.219-6, Notice of Total Small Business Set-Aside (JUNE 2003) (15 U.S.C. 644).

\_\_\_ (ii) Alternate I (OCT 1995) of 52.219-6.

\_\_\_ (iii) Alternate II (MAR 2004) of 52.219-6.

- \_\_\_ (6)(i) 52.219-7, Notice of Partial Small Business Set-Aside (JUNE 2003) (15 U.S.C. 644).
- \_\_\_ (ii) Alternate I (OCT 1995) of 52.219-7.
- \_\_\_ (iii) Alternate II (MAR 2004) of 52.219-7.
- \_\_\_ (7) 52.219-8, Utilization of Small Business Concerns (MAY 2004) (15 U.S.C. 637 (d)(2) and (3)).
- \_\_\_ (8)(i) 52.219-9, Small Business Subcontracting Plan (JUL 2005) (15 U.S.C. 637(d)(4)).
- \_\_\_ (ii) Alternate I (OCT 2001) of 52.219-9
- \_\_\_ (iii) Alternate II (OCT 2001) of 52.219-9.
- \_\_\_ (9) 52.219-14, Limitations on Subcontracting (DEC 1996) (15 U.S.C. 637(a)(14)).
- \_\_\_ (10)(i) 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns (JUL 2005) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323) (if the offeror elects to waive the adjustment, it shall so indicate in its offer).
- \_\_\_ (ii) Alternate I (JUNE 2003) of 52.219-23.
- \_\_\_ (11) 52.219-25, Small Disadvantaged Business Participation Program--Disadvantaged Status and Reporting (OCT 1999) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).
- \_\_\_ (12) 52.219-26, Small Disadvantaged Business Participation Program--Incentive Subcontracting (OCT 2000) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).
- \_\_\_ (13) 52.219-27, Notice of Total Service-Disabled Veteran-Owned Small Business Set-Aside (May 2004).
- XX \_\_\_ (14) 52.222-3, Convict Labor (JUNE 2003) (E.O. 11755).
- \_\_\_ (15) 52.222-19, Child Labor--Cooperation with Authorities and Remedies (Jun 2004) (E.O. 13126).
- XX \_\_\_ (16) 52.222-21, Prohibition of Segregated Facilities (FEB 1999).
- XX \_\_\_ (17) 52.222-26, Equal Opportunity (APR 2002) (E.O. 11246).
- XX \_\_\_ (18) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (DEC 2001) (38 U.S.C. 4212).
- XX \_\_\_ (19) 52.222-36, Affirmative Action for Workers with Disabilities (JUN 1998) (29 U.S.C. 793).
- \_\_\_ (20) 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (DEC 2001) (38 U.S.C. 4212).
- \_\_\_ (21) 52.222-39, Notification of Employee Rights Concerning Payment of Union Dues or Fees (DEC 2004) (E.O. 13201).
- \_\_\_ (22)(i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (AUG 2000) (42 U.S.C. 6962(c)(3)(A)(ii)).

\_\_\_\_ (ii) Alternate I (AUG 2000) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)).

\_\_\_\_ (23) 52.225-1, Buy American Act--Supplies (JUNE 2003) (41 U.S.C. 10a-10d).

\_\_\_\_ (24)(i) 52.225-3, Buy American Act--Free Trade Agreements--Israeli Trade Act (Jan 2005) (41 U.S.C. 10a-10d, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note, Pub. L. 108-77, 108-78, 108-286).

\_\_\_\_ (ii) Alternate I (JAN 2004) of 52.225-3.

\_\_\_\_ (iii) Alternate II (JAN 2004) of 52.225-3.

\_\_\_\_ (25) 52.225-5, Trade Agreements (Jan 2005) (19 U.S.C. 2501, et seq., 19 U.S.C. 3301 note).

\_\_\_\_ (26) 52.225-13, Restrictions on Certain Foreign Purchases (MAR 2005) (E.o.s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of Treasury).

\_\_\_\_ (27) 52.225-15, Sanctioned European Union Country End Products (FEB 2000) (E.O. 12849).

\_\_\_\_ (28) 52.225-16, Sanctioned European Union Country Services (FEB 2000) (E.O. 12849).

\_\_\_\_ (29) 52.232-29, Terms for Financing of Purchases of Commercial Items (FEB 2002) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

\_\_\_\_ (30) 52.232-30, Installment Payments for Commercial Items (OCT 1995) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

XX \_\_\_\_ (31) 52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration (OCT 2003) (31 U.S.C. 3332).

\_\_\_\_ (32) 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration (MAY 1999) (31 U.S.C. 3332).

\_\_\_\_ (33) 52.232-36, Payment by Third Party (MAY 1999) (31 U.S.C. 3332).

\_\_\_\_ (34) 52.239-1, Privacy or Security Safeguards (AUG 1996) (5 U.S.C. 552a).

\_\_\_\_ (35)(i) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (APR 2003) (46 U.S.C. Appx 1241 and 10 U.S.C. 2631).

\_\_\_\_ (ii) Alternate I (APR 2003) of 52.247-64.

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items: [Contracting Officer check as appropriate.]

XX \_\_\_\_ (1) 52.222-41, Service Contract Act of 1965, as Amended (JUL 2005) (41 U.S.C. 351, et seq.).

XX \_\_\_\_ (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (MAY 1989) (29 U.S.C. 206 and 41 U.S.C. 351, et seq.).

XX \_\_\_\_ (3) 52.222-43, Fair Labor Standards Act and Service Contract Act--Price Adjustment (Multiple Year and Option Contracts) (MAY 1989) (29 U.S.C. 206 and 41 U.S.C. 351, et seq.).

\_\_\_\_ (4) 52.222-44, Fair Labor Standards Act and Service Contract Act--Price Adjustment (February 2002) (29 U.S.C. 206 and 41 U.S.C. 351, et seq.).

XX \_\_\_\_ (5) 52.222-47, SCA Minimum Wages and Fringe Benefits Applicable to Successor Contract Pursuant to Predecessor Contractor Collective Bargaining Agreements (CBA) (May 1989) (41 U.S.C. 351, et seq.).

(d) Comptroller General Examination of Record. The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records--Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e) (1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c), and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in paragraphs (i) through (vi) of this paragraph in a subcontract for commercial items. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause--

(i) 52.219-8, Utilization of Small Business Concerns (May 2004) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds \$500,000 (\$1,000,000 for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(ii) 52.222-26, Equal Opportunity (April 2002) (E.O. 11246).

(iii) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (December 2001) (38 U.S.C. 4212).

(iv) 52.222-36, Affirmative Action for Workers with Disabilities (June 1998) (29 U.S.C. 793).

(v) 52.222-39, Notification of Employee Rights Concerning Payment of Union Dues or Fees (DEC 2004) (E.O. 13201).

(vi) 52.222-41, Service Contract Act of 1965, as Amended (Jul 2005), flow down required for all subcontracts subject to the Service Contract Act of 1965 (41 U.S.C. 351, et seq.).

(vii) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (April 2003) (46 U.S.C. Appx 1241 and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64.

(2) While not required, the contractor May include in its subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

<http://www.arnet.gov/far>

<http://www.farsite.hill.af.mil>

<http://www.dtic.mil/dfars>

(End of clause)

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## SECTION 01005

## SITE SPECIFIC SUPPLEMENTARY REQUIREMENTS

## PART 1 GENERAL

## 1.1 COORDINATION AND WORK HOURS

1.1.1 Coordination with local government agencies and adjoining property owners shall be made through the Contracting Officer to assist the Contractor in completing the work with a minimum of interference and inconvenience.

1.1.2 Work hours in the construction area will be restricted to 7:00 a.m. to 4:00 p.m. daily, Monday through Friday, excluding holidays. Work hours other than as specified above shall be coordinated with and approved by the Contracting Officer. Alternate work schedules will not be approved if a Government quality assurance inspector is not available to be on site full time during all hours outside those previously stated. Work hours may be restricted to 8:00 p.m. to 1:00 p.m. during Industrial Fire Protection (IFP) Level III periods. Notification of these work hours will be made by the Contracting Officer with consultation with the Washington Department of Natural Resources.

## 1.2 GENERAL ACCESS REQUIREMENTS

This section describes controls and restrictions regarding site access and Green River watershed activities. The watershed provides drinking water for over 300,000 people and must necessarily be protected during construction. Only authorized personnel (Government personnel or Contractor personnel participating in Government business) may enter the restricted watershed.

1.2.1 The Contractor shall submit a complete listing of Contractor personnel, including job title and identification credential number, who will be working on the project. This listing shall be updated as needed to ensure that the Government has been notified of any changes of Contractor Personnel in advance of new personnel engaging in work on the project. The Government will allow access to the controlled areas of only the Contractor Personnel authorized in advance and included on the employee listing. The list will be submitted the week prior to personnel arrival on-site. The list shall be revised on each occasion of change of employees and the revised list provided to the Contracting Officer during weekly meetings.

## 1.2.1.1 Identification Credentials

Contractor personnel shall either be issued a photo identification card (ID) by the Contractor or agree to provide their individual vehicle driver's license as appropriate identification credential. In either case, the identification number shall be included on the listing required above. If the Contractor determines to issue ID cards to its employees, the following information shall be included:

Contractor Identification and Card Number Indicating Employees:

- |                     |              |
|---------------------|--------------|
| o Full Name         | o Height     |
| o Current Address   | o Weight     |
| o Birth Date        | o Hair Color |
| o Recent Photograph | o Eye Color  |

Contractor personnel shall be instructed to present identification credential upon request by proper authority as established by the Contracting Officer.

1.2.1.2 Employee Termination

If a Contractor employee resigns or is terminated the Contracting Officer, or designated representative shall be so notified at the earliest opportunity, but in no case later than the start of the succeeding workday.

1.2.3 Contractor employee parking shall be in the designated areas. The Contractor is responsible for providing shuttle transportation from the designated parking areas to the work areas. Contractor trade vehicles will be permitted on the worksite as needed to perform construction activities. All vehicles entering the site shall be permitted and insured to the Contracting Officer's requirements and shall be properly maintained to be free of drips and leaks of oil and other fluids.

1.2.4 The Contractor shall instruct all persons who enter the watershed on its behalf the nature of the watershed and to the serious consequences arising from failure to comply with access guidelines. The Contractor shall provide a copy of these guidelines to all employees and agents who enter the watershed. A copy of these guidelines shall also be posted in a conspicuous place at each worksite. All gates at the worksite are provided to control access and shall be kept locked at all times, except as otherwise specifically approved by the Contracting Officer.

1.3 NOT USED

1.4 CONTRACTOR'S VEHICLES

Contractor's vehicles shall carry proof of insurance at all times and shall be equipped with CB radios (to be tuned to Channel 10). Contractor's lowboys with equipment extending on the sides of the trailer shall be preceded by pilot cars while traveling along the access road to the dam site.

1.5 CONTRACTOR SECURITY

The Corps of Engineers will not be responsible for providing security for Contractor-owned/controlled equipment, supplies, or materials. The Contractor shall provide those necessary security measures.

1.6 CAMPS, HOUSING FACILITIES, AND ANIMALS

Except as specified in this contract, no camps or housing facilities may be constructed or maintained within the watershed area. Camping, swimming or fishing are not allowed within watershed boundaries. No domestic animals, such as dogs, cats, ferrets, or other are allowed in the watershed or on the worksite.

### 1.7 EROSION CONTROL

All construction activities shall be conducted in a manner to prevent erosion or siltation. Where culverts, ditches or drainage are necessary for protection of surface water quality, such facilities shall be constructed by the Contractor per the plans and specifications.

### 1.8 PESTICIDES AND PLANT NUTRIENTS

Pesticides or plant nutrients shall not be applied to the watershed without prior approval of the Contracting Officer. Approval shall be required for each specific activity.

### 1.9 WATER QUALITY STANDARDS

#### A. Public Water Supply

1. Water from Howard Hanson Dam Reservoir and Green River is used for municipal water supply for over 300,000 people in Pierce County. The source is unfiltered. Extreme care shall be taken by the Contractor to protect water quality during the construction period.

The documents that contain the relevant criteria for Howard Hanson Dam Reservoir and Green River surface water and public water supply quality are:

- a. National Primary Drinking Water Regulations plus amendments promulgated as part of the Safe Drinking Water Act, PL 93-523.
- b. Rules and Regulations of the State Department of Health Regarding Public Water Systems, Revised July 1999, WAC 246-290 Public Water Systems and amendments.
- c. State of Washington Department of Ecology Surface Water Quality Regulations.

### 1.10 REGULATORY REQUIREMENTS

1.10.1 All activities in the Green River Watershed shall be conducted in compliance with all other applicable federal, state, and local laws, rules and regulations for the protection of domestic water supplies.

1.10.2 The project site lies within a forested area. The Contractor shall comply with all forest fire laws, rules and regulations of the State of Washington and such additional Department of Natural Resources and City of Tacoma Public Utilities guidelines as are deemed necessary. A copy of all pertinent fire regulations shall be posted at all work sites. All Contractor tools and equipment shall be kept in serviceable condition, and shall at all times be readily available for fighting fires. Failure to comply with the fire control regulations will be a material breach of contract.

### 1.10 CONSTRUCTION SEQUENCE AND SCHEDULING

#### 1.10.1 In-Water Work Activities

The in-water work shall be restricted to the period of August 1, 2005 to January 31, 2006 in accordance with Washington Department of Fish and

Wildlife rules for protection of fish. Any work occurring after January 31 will be approved on a day-by-day basis by the Government after consultation with the Washington Department of Fish and Wildlife.

#### 1.11 BRIDGE LOAD LIMITS

Load limits have been established for bridges as follows:

- |   |                          |
|---|--------------------------|
| • Sweeney Creek, Road 3703, Milepost 22 | U102/LFRD-rated          |
| • One Lane Bridge, Road 5500, MP-1      | 160 tons                 |
| • Friday Creek, Road 5900, MP-9         | 12 tons                  |
| • Smay Creek, Road 5900, MP-1           | 25 tons (Type 3 truck)   |
|   | 35 tons (Type 3S2 truck) |
|   | 41 tons (Type 3-3 truck) |
| • North Fork, Road 5500, MP-7¼          | 20 tons (Type 3 truck)   |
|   | 32 tons (Type 3S2 truck) |
|   | 37 tons (Type 3-3 truck) |

#### 1.12 Environmental Protection

All equipment working below the ordinary high water mark shall be steam cleaned prior to work initiation and shall operate using vegetable-based hydraulic fluid.

#### 1.13 Animal Protection

All work will be conducted in the City of Tacoma Watershed and contact with wild animals, including but not limited to elk, bear, and cougar, may occur. Procedures for working in wildlife areas will be addressed on a site-by-site basis with the Contracting Officer. All work locations will be maintained on a daily basis to minimize attraction of wild animals.

#### 1.16 Road Usage Fees

A road use fee of \$25.00 per trip will be charged to the Contractor for use of Road 5500 for all trucks in excess of 14,000 pounds. The number of inbound trips will be tracked at the Headwork's Control Gate. Payment shall be made directly to the City of Tacoma. No separate payment will be made for this fee by the government. The Contractor must contact Mr. Bryan King, City of Tacoma Watershed Manager at (253) 502-8808 for specific payment information.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

## SECTION 01061

### ENVIRONMENTAL PROTECTION

#### PART 1 GENERAL

##### 1.1 NOT USED

##### 1.2 SCOPE

This Section covers prevention of environmental pollution and damage as the result of construction operations under this contract. For the purpose of this specification, environmental pollution, and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for esthetic, cultural, and/or historical purposes. The control of environment pollution and damage requires consideration of air, water, and land, and includes management of visual esthetics, noise, and solid waste, as well as other pollutants.

##### 1.3 NOTIFICATION

When the Contracting Officer notifies the Contractor in writing of any observed noncompliance with Federal, state, or local laws, regulations, or permits, the Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or costs or damage allowed to the Contractor for any such suspension.

##### 1.4 PROTECTION OF ENVIRONMENTAL RESOURCES

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications. The Contractor shall comply with all applicable federal, state, and local laws and regulations. Environmental protection shall be as stated in the following subparagraphs:

###### 1.4.1 Protection of Land Resources

The Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without special permission from the Contracting Officer except as otherwise specified or indicated.

###### 1.4.2 Disposal of Garbage

Garbage shall be placed in bear-proof containers meeting requirements of Forest Service Publication 0223 1302-SDTDC, that will be emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination of the watershed.

#### 1.4.3 Refuse Disposal and Cleanup

Refuse shall be defined as debris other than such organic materials as brush or tree stumps. The cost of refuse disposal, such as transportation, handling, dumping fees as applicable, and similar cost, shall be included in the contract price. Refuse shall be disposed of off site, in accordance with all local, state, and Federal rules and regulations, at the Contractor's expense.

##### 1.4.3.1 Fire Hazard

Cloths, cotton waste, and other combustible materials that might constitute a fire hazard shall be placed in closed metal containers and placed outside or destroyed at the end of each day. The Contractor shall comply with all Washington Department of Natural Resources Industrial Fire Protection restrictions as directed by the COR.

#### 1.4.4 Restrictions

Refuse shall not be burned. Burning of vegetation or tree stumps will not be allowed unless the worksite is in an area approved for burning.

#### 1.4.5 Disposal of Chemical or Hazardous Waste

Chemical or hazardous waste shall be stored in corrosion-resistant containers, removed from the work area, and disposed of in accordance with Federal, State, and local regulations.

#### 1.4.6 Disposal of Discarded Materials

Discarded materials, other than those which can be included in the solid waste category, shall be handled as directed.

#### 1.4.7 Protection of Water Resources

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Specifically, the Contractor shall be familiar with, and shall adhere to the specific conditions of the Water Quality Certification issued by the Washington Department of Ecology for the project. Compliance activities may include, but are not limited to the full implementation of the Stormwater Pollution Prevention Plan provided by the government; installation and maintenance of Temporary Sediment and Erosion Control measures in Accordance with the Stormwater Manual for Western Washington.

##### 1.4.7.1 Sediment and Erosion Control Best Management Practices (BMPs)

The Contractor shall install and maintain the following Sediment and Erosion Control BMPs for the chosen helicopter refueling area in The Stormwater Manual for Western Washington:

- Silt Fence
- Hay bale and straw wattle/tube energy dissipaters

##### 1.4.7.2 NOT USED

#### 1.4.7.3 Prevention of Invasive Species in the Watershed

The Contractor shall comply with the directions for the decontamination of equipment and the prevention of Invasive Species introduction as outlined in Specification 01563 Pollution Control.

#### 1.4.8 Particulates

Dust particles, aerosols, and gaseous byproducts from construction activities, processing, and preparation of materials shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. See Section 01561, DUST CONTROL

#### 1.5 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant. Additional information may be obtained from Specification 01563 Pollution Control.

PART 2 NOT USED.

PART 3 NOT USED.

-- End of Section --

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SECTION 01501

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 NOT USED

1.2 AVAILABILITY OF UTILITY SERVICES

1.2.1 Water and Electricity

The Contractor shall be responsible for providing its own water and electricity.

1.3 NOT USED

1.4 NOT USED

1.5 STAGING AREA

Contractor will be provided adequate open staging area in the watershed as directed by the Contracting Officer. Area is unsecured, and Contractor shall make provisions for its own security.

PART 2 (NOT APPLICABLE)

PART 3 (NOT APPLICABLE)

-- End of Section --

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## SECTION 01563

## POLLUTION CONTROL

## PART 1 GENERAL

## 1.1 SCOPE

This section describes the work required to control water pollution caused by construction activities.

## 1.2 PROJECT CONDITIONS

The Contractor shall maintain pollution control systems throughout the life of the contract including during periods when construction activities are reduced or shutdown. During the life of the contract the Contractor shall comply with all provisions of federal, state and local statutes, ordinances and regulations pertaining to the prevention of environmental pollution and the preservation of public natural resources. The Contractor shall maintain a copy of all project-related permits, permit conditions, and the SWPPP/water quality monitoring plan at each active site during work hours. Additionally, the Contractor shall operate his equipment only in designated and approved work zones and access routes.

## 1.3 EQUIPMENT DECONTAMINATION

All equipment entering the watershed shall be decontaminated as specified prior to entry at an approved location. Decontamination shall be witnessed and verified by a representative of the City of Tacoma. No item of equipment will be allowed to enter the watershed until this verification occurs. Any item of equipment found not to have undergone decontamination prior to entering the watershed shall be removed from the area within the historic high water mark for the river and placed out of service until decontamination at the approved location, witnessed and verified by the City of Tacoma, has occurred. Contractor shall be responsible for worker refuse collection, and spill kits at each site as well as with each piece of equipment.

## PART 2 PRODUCTS

## 2.1 OIL SPILL CLEANUP KIT

The Contractor shall at all times maintain one emergency spill clean-up kit at each work site. The kits shall be secured and identified as "emergency use" only. Each oil spill cleanup kit shall contain the following items as a minimum:

- a. Twelve medium weight metal fence posts, 6 feet long
- b. 100 Feet of 1/4-inch rope for anchoring booms
- c. Two axes
- d. Two hammers
- e. Two shovels
- f. Two screened pitchforks
- g. Two 6-Volt flashlights including extra batteries
- h. 200 Feet of portable oil containment boom
- i. 200 Feet of oil absorbent boom
- j. Five 5-Gallon empty containers with lids

- k. Two pair of cotton work gloves
- l. 40 Feet of 1/4-inch mesh screen, minimum 3 feet high
- m. A minimum of 100 oil absorbent pads
- n. 25 Plastic garbage bags
- o. A map of the drainage area
- p. A copy of the Emergency Response Plan with notification procedures and telephone

#### 2.1.2 VEHICLE SPILL KITS

Each piece of equipment working below the Ordinary High Water line, as designated on the plan set, shall carry a 5-gallon first response-type spill kit. The kit shall be easily accessible to the operator, and shall consist at a minimum of 1 5-gallon plastic buck with lid, appropriate spill kit labels, 1 pair cotton work gloves, one plastic garbage bag, and enough oil absorbent pads to fill the bucket. Commercially available spill kits may be used, subject to the approval of the COR.

### 2.2 OIL ABSORBING MATERIALS

#### 2.2.1 GENERAL

Oil absorbing products shall be oleophilic and hydrophobic, constructed of blown polypropylene fibrous material meeting the requirements described below and shall be 3M Brand Oil Sorbent as manufactured by Occupational Health and Safety Products Division/3M, St. Paul, Minnesota or equal.

#### 2.2.2 PHYSICAL PROPERTIES

Property	Test Method	Value
Mildew	MIL-I-631 Section 3.5.7	Mildew and rot resistant
Temperature Range		Performance unaffected between 20 F and 150 F
Humidity		Performance unaffected by 100% relative humidity at 100 F for 25 days
Flammability	ASTM D2859 ASTM D1929	Resistant to flammability. Shall not auto-ignite at temperature below 650 F
Oil Absorption	MIL-S-28600 Section 4.4.3	Absorb 20-30 times its weight in oil depending on the grade and time exposed
Water Repellency	MIL-S-28600 Section 4.4.3	Less than 0.5 grams water /gram Absorbent

#### 2.2.3 OTHER PROPERTIES

Oil absorbing materials shall have sufficient strength to allow them to be secured and remain in position for the applications shown. The materials shall be reusable and shall not have any irritating or toxic effects on

personnel that handle the material. The Contractor shall supply oil absorbing materials in the form of sheets, rolls, sweeps, pillows or booms as required for effective control of spilled oil at the various project locations.

#### 2.2.4 TYPES OF OIL ABSORBING MATERIALS

##### 2.2.4.1 Oil Absorbent Pads

The oil absorbent pads shall be sorbent sheets approximately 18 inches by 18 inches by 3/8-inch thick. Pads shall be easy to apply, retrieve, and shall be reusable. They shall be new 3M Brand, Model No. T-1 56 or equal.

##### 2.2.4.2 Oil Absorbent Booms

The oil absorbent boom shall come in minimum 10-foot sections and be at least 5 inches in diameter. Boom shall be constructed of oil absorbing material contained in an open mesh skin. The ends shall be constructed to allow easy attachment of one boom to another to form longer booms or for anchoring. The boom shall be 3M Brand Model T-270 Sorbent Booms or equal.

#### 2.3 EMERGENCY SPILL KIT OIL CONTAINMENT BOOM

The emergency spill kit oil containment boom shall meet the requirements specified below and shall be Action Petroleum Spill Recovery Standard Oil Boom Model AP10 or equal. Minimum requirements include:

Boom Tensile Strength	5,000 pounds
Fabric Weight	22 ounces
Fabric Tensile Strength	5,000 pounds
Fabric Tongue Tear Strength	150 pounds
Buoy Ratio	3.25
Flotation	Air or Foam
Height	10 inches
Float diameter	4 inches
Skirt Length	6 inches
Ballast Chain	inch

#### 2.4 REFUELING AND CHEMICAL/PETROLEUM STORAGE AREAS

A. The refueling and chemical/petroleum storage area shall be sized, designed, constructed, and maintained by the Contractor in accordance with those minimum requirements, dimensions, and design elements as indicated in the project Drawings.

B. Refueling and chemical/petroleum storage area shall be proposed within the general project area by the Contractor subject to approval of the Contracting Officer. If the Contractor proposes to use areas not shown as work limits in this contract, he shall provide documentation of the rights acquired to use the property from pertinent landowners, including the City of Tacoma.

#### 2.5 BACKFLOW PREVENTERS

Backflow preventer assemblies shall be approved by the Washington State Department of Health.

## 2.6 DECONTAMINATION EQUIPMENT AND SUPPLIES

Decontamination of construction materials, boats, and equipment entering the river shall require the following items:

1. Pressure washer having a minimum pressure of 2,000 pounds per square inch.
2. Steam cleaner.
3. Pressurized tank sprayer or spray bottle suitable for chlorine application.
4. Chlorine bleach.
5. Biodegradable soap (for equipment and materials that would be damaged by chlorine).
6. Rubber boots.
7. Splash suit or full waterproof rain gear.
8. Rubber gloves and duct tape.
9. Goggles.
10. Chlorine dip tank (for small equipment and materials).
11. Washdown pad with drain to wastewater holding tank (for large equipment and materials as shown on the Drawings).
12. Sodium thiosulfate or ascorbic acid or other dechlorinating chemical (for chlorine neutralization).
13. Field test kit for total residual chlorine.
14. Process water source

## 2.7 SMALL EQUIPMENT CONTAINMENT

All motorized, portable, stand alone, or stationary equipment shall have completely liquid tight, self-supporting, containment pans placed under the equipment. The containment pan shall be sized to hold 110% of the volume of all fuels, oils, and liquids contained within the equipment. The equipment pan shall be accessible for easy monitoring and shall have a low point to facilitate the pumping or removal of contaminated liquids. All leaks, spills, accumulated storm water, or liquids shall be immediately removed from the containment pan and transferred off-site for proper disposal by the contractor.

## PART 3 EXECUTION

### 3.1 PREVENTION OF EXOTIC AQUATIC SPECIES IN TACOMA WATER SUPPLY WATERSHEDS

Several aquatic organisms currently create or have the potential to create nuisance conditions in Washington state waters. Once established in an aquatic system, infestations of these exotic pests can be difficult to control and impossible to eradicate.

Seven nonnative aquatic pest species are specific targets of this prevention program. Six are invasive aquatic plant species: Eurasian watermilfoil, parrotfeather, hydrilla, Brazilian elodea, fanwort, and water hyacinth. A freshwater mollusk, the zebra mussel, is the single animal species targeted in this prevention program. Information for identifying these species is provided in the last section of this document.

Information has not been provided in this document for identifying emergent plant species that invade shorelines of water bodies. Two emergent plant species of particular concern are purple loosestrife (*Lythrum salicaria*) and reed canary grass (*Phalaris arundinacea*). Information for identifying these

highly invasive plants may be obtained from the King County Noxious Weed Board.

All of these pest species except the zebra mussel have been positively documented in freshwaters of Washington State. Eurasian watermilfoil has already infested Lake Youngs Reservoir. The infestation began at the boat ramp and was most likely introduced by plant fragments from a boat or trailer. Aquatic vessels and equipment represent a primary means of transport of all of these nonnative pest species from one location to another. To prevent the introduction of milfoil and other exotic invasive plants and animals into new areas, a continuing program is required that consistently follows established decontamination procedures.

This prevention program covers all construction activities. All Contractor personnel working in any surface waters (including rivers and streams) within these watersheds are required to use these procedures.

This document outlines general responsibilities of field personnel working in any of the water supply reservoirs and watersheds within the jurisdiction of Tacoma Public Utilities. A detailed equipment decontamination procedure is described. In addition to prevention of exotic aquatic species, the decontamination procedure is designed to prevent contamination by any biological organism (i.e., plant, animal, or microbe that is either a native or exotic species and may be terrestrial or aquatic in origin), and by any chemical or petroleum product. A reference section is also provided describing the six exotic plant species and one exotic animal species targeted by this program.

### 3.1.1 Responsibilities of Field Personnel Working in Watersheds

All Contractor personnel have the following responsibilities:

- Use machinery and equipment that have not previously been used in other aquatic systems whenever possible.
- If it is necessary to use machinery or equipment that has been previously used outside Tacoma water supply watersheds, follow the decontamination procedure outlined below before beginning work in any surface water body.

The decontamination procedure is also required for new machinery and equipment to prevent any chemical or biological contamination of surface waters. Machinery and equipment shall be decontaminated even if it was last used in a different Tacoma water supply watershed. The terms *machinery and equipment* include boats, barges, trailers, cranes, excavators, cables on heavy equipment, drilling rigs, silt curtains, hoses, pumps, pipes, shovels, waders, nets, scuba equipment, scientific equipment, and any other personal equipment.

### 3.1.2 Decontamination Equipment and Supplies

The following items are needed by field crews conducting equipment-cleaning procedures in preparation for work in Tacoma water supply watersheds:

- Hot-water pressure washer providing a minimum temperature of 180° F (82° C) and a minimum pressure of 2,000 pounds per square inch
- Pressurized tank sprayer or spray bottle

- Chlorine bleach
- Brush and biodegradable soap (for equipment that would be damaged by chlorine)
- Rubber boots
- Splash suit or full waterproof rain gear
- Rubber gloves and duct tape
- Safety goggles and eye wash.

Repetitive decontamination of small equipment or extensive decontamination of large equipment may require the following additional items:

- Chlorine dip tank (for small equipment)
- Portable wash pad with drain to wastewater holding tank (for large equipment)
- Sodium thiosulfate (for chlorine neutralization)
- Field test kit for total residual chlorine.

Decontamination of machinery and equipment exhibiting petroleum or chemical contamination may require special equipment for containment, treatment, and disposal of wash waters.

### 3.1.3 Contractor Responsibilities

Private contractors working on surface waters within Tacoma water supply watersheds have the following additional responsibilities:

- Provide all of the decontamination equipment and supplies.
- Distribute copies of this exotic aquatic species prevention program to all crewmembers and subcontractors.
- Use the attached equipment decontamination log to confirm in writing that each crewmember has read, understood, and agrees to comply with the program.
- Use the attached equipment decontamination log to document other sites where machinery and equipment were used or stored during the previous 60 days.
- Schedule decontamination and inspection of machinery and equipment with the Tacoma Public Utilities staff authorized to oversee the procedures.
- Reschedule decontamination and inspection if machinery or equipment has been taken outside the watershed.

### 3.1.4 Equipment Decontamination Procedure

The decontamination requirement covers all aquatic vessels, machinery, and equipment that is new or has been previously used outside Tacoma water supply watersheds. Any use of vessels or equipment in surface waters during the previous year must be documented with dates and locations on the attached equipment decontamination log.

Equipment decontamination must be conducted at a decontamination site approved by the Government.

This site will be located in an area that is well away from surface waters, suitable for local infiltration of wash waters, and will have a water tap and hose for rinsing equipment. Additional sites are being developed. Use of



any other decontamination sites must be approved by Tacoma Public Utilities and the Contracting Officer.

Physical removal or destruction of any propagating portions of all plant and animal species is an important first step in the required decontamination procedure. An additional step of the cleaning protocol involves washing with a chlorine-bleach solution. Although chlorine is primarily used by Tacoma Public Utilities for disinfection, chlorine can be effective against living plant tissue and has been used for control of zebra mussels in Europe, the United States, and Canada. Chlorine treatment must be implemented in a prudent manner to minimize exposure of non-target aquatic organisms to wash water.

Hot water treatment or extended drying is required as an additional decontamination step for prevention of zebra mussel infestation. Zebra mussels and most plant tissues are intolerant of high temperatures. Tests have shown that exposure of zebra mussels to temperatures of 40°C (104°F) kills immature forms, and sustained exposure to water temperatures of 60°C (140°F) for more than 15 minutes causes death in adults. Because of the latter requirement for adult zebra mussel mortality, hot water may not be an effective treatment used alone, unless the entire piece of equipment can be subjected to sustained high temperatures for a minimum of 15 minutes. Extended drying of equipment may also be effective, because the reported maximum out-of-water survival time in ideal conditions is about 10 days for adult zebra mussels.

The decontamination and cleaning procedure has five steps:

1. Visual inspection and physical removal and disposal of obvious plant fragments and mussel shells
2. Pressure wash with hot water
3. Wash with chlorine solution
4. Final visual inspection (to be performed by Tacoma Public Utilities staff).

The detailed procedure follows.

1. **Examine all parts of the equipment looking for any plant fragments, mussel shells, or any foreign matter.** If material is green or looks like a clam shell, remove it. Pay special attention to the following areas where small plant pieces or mussel shells can easily be hidden or lodged:

- Storage wells and the floors of boats
- Motor, propeller, and motor well
- Hitch and bumper area
- Trailer frame, inside and outside
- Vehicle and trailer axles and fender wells
- Gears and axles on mechanized equipment (remove metal grating to inspect these areas).

Properly dispose of removed materials in a refuse facility (e.g., garbage can). Complete the remaining steps in the decontamination process, even if no biological material is visible.

2. **Pressure wash surfaces with hot water.** Slowly direct the pressure washer stream at all surfaces, especially the areas listed in step 1. The pressure washer shall provide a minimum temperature of 180° F (82° C) and a minimum pressure of 2,000 pounds per square inch. Pressure washing technique may vary for materials having different sensitivity to pressure and temperature. The nozzle type, spray distance, and application rate shall be adjusted to thoroughly remove all foreign substances without damaging the equipment being decontaminated. Boat motors and other equipment with internal surfaces that contact water shall be flushed with at least three volumes of hot water.

For new equipment or fragile materials that could be damaged by the pressure washer stream (e.g., fabrics and scientific instruments), surfaces may be washed with a brush during the next step instead of a pressure washer. Temperature-sensitive equipment may be stored completely dry for at least 10 days at the decontamination site as an alternative to pressure washing with hot water. Machinery and equipment exhibiting petroleum or chemical contamination shall not be washed in the watershed unless wash waters can be completely contained, and either properly disposed at an offsite facility or adequately treated at the decontamination site (e.g., filtered through oil-absorbing material). Biodegradable detergent may be used to enhance removal of petroleum contamination if wash waters are properly disposed.

3. **Wash surfaces with chlorine solution, following safety and environmental precautions outlined below.** Follow pressure wash with chlorine solution (see below) applied with a coarse spray using a pressurized tank sprayer or spray bottle. Concentrate spray especially toward tight spaces and crannies where plant pieces or shells might collect. Allow bleach solution to remain on the equipment for a minimum of 10 minutes. Rinse bleach solution off with fresh water.

For cleaning equipment that can be damaged by bleach, instead scrub with liquid biodegradable soap. For repetitive decontamination of small equipment, a dip tank filled with chlorine solution may be used instead of a coarse spray. For large equipment and vessels, the coarse spray of chlorine solution must be collected on a portable wash pad that drains to a wastewater holding tank. Spent chlorine solution in dip tanks or holding tanks must be neutralized before disposal onsite (see environmental precautions below).

Chlorine solution is not stable and must be made fresh daily. It readily decomposes to salt and water when exposed to sunlight. An effective chlorine solution must contain approximately 200 milligrams per liter (mg/L) free available chlorine. This concentration can be obtained by diluting fresh household bleach (off-the-shelf Clorox contains approximately 5 percent chlorine), according to the following table.

Household Bleach	Water
4 milliliters	1 liter
40 milliliters	10 liters
1 tablespoon	1 gallon
1 cup	16 gallons
3¼ cups	50 gallons

**Personal Safety Precautions for Use of Chlorine Solution:**

Household bleach and chlorine solution can cause skin and eye burns on contact. Thus, any person conducting decontamination activities with the chlorine solution should be appropriately clothed, wearing goggles, rubber boots, full waterproof rain gear or chemical splash suit, and rubber gloves taped onto raincoat sleeve at the wrist.

***Environmental Precautions for Use of Chlorine Solution:***

To protect the environment, take care to prevent the chlorine solution from entering or being washed directly into surface waters. It is preferable to use a coarse spray for chlorine applications, and rinse the equipment where the rinse water will puddle to allow time for the photodecomposition process. (Even overcast days have enough cloud-piercing ultraviolet radiation to do the job.) Spent chlorine solution in dip tanks or wastewater holding tanks must not be discharged onsite without neutralization and testing for chlorine.

Sodium thiosulfate will neutralize chlorine at ratios between 1.6 and 3 by weight, depending on pH of the solution. Based on a ratio of 2.5 for a pH of 7.8, 500 mg/L of sodium thiosulfate is needed to neutralize 200 mg/L of free available chlorine. Therefore, 0.21 pounds (95 grams) of sodium thiosulfate is needed to neutralize 50 gallons (189 liters) of chlorine solution wastewater. Adjust the amount of sodium thiosulfate, in proportion to the amount of chlorine solution. Also, begin neutralization with less than the prescribed amount of sodium thiosulfate, because significant amounts of chlorine may have decomposed since the chlorine solution was made. Test the neutralized chlorine solution for total residual chlorine using a field test kit (a DPD test kit can be obtained through a scientific supply company). Follow instructions in the kit. Make sure the neutralizing agent is adequately mixed. If the test result color is red, add a little more sodium thiosulfate to the wastewater. The test color should be pink or clear. Continue adding the neutralizer until this color is obtained in a test sample and the chlorine concentration is less than 1 mg/L. The neutralized solution can then be permitted to soak into the ground at the decontamination site.

4. **Inspect all surfaces again for plant fragments or mussel shells.** A final inspection and approval of vessels, machinery, and equipment must be conducted by authorized Tacoma Public Utilities staff, and documented on the attached equipment decontamination log.

This decontamination procedure must be repeated if the machinery or equipment is removed from the work site. However, pressure washing (Step 2) may be omitted for equipment transferred from one location to another within the watershed. Tacoma Public Utilities staff are available to provide information and assistance in complying with this procedure.

#### 3.1.5 Personnel Boot Decontamination

All personnel who enter the water inside the watershed shall first wash their boots to prevent bringing into the watershed exotic species. Tacoma Public Utilities will set up a wash station with a hose, brushes and biodegradable soap at the watershed office.

### Tacoma Public Utilities Equipment Decontamination Log

Project: \_\_\_\_\_

Date of Decontamination for use in TPU waters: \_\_\_\_\_

Piece of Equipment*	Date(s) of Use in other water bodies	New Equipment	Water Body	Location	Known Exotic Species Present in Water Body

\*Equipment used in water during the previous year.

Each crewmember has received, read, understood, and agrees to comply with the decontamination requirements of the exotic aquatic species prevention program.

\_\_\_\_\_  
Name, title, company

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

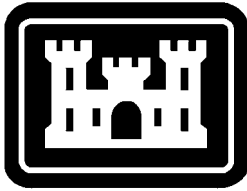
Final inspection performed by:

\_\_\_\_\_  
Name, title (Tacoma Public Utilities)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

-- End of Section --



U.S. Army Corps  
of Engineers  
Northwest Division  
Seattle District

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# Final Construction Stormwater Pollution Prevention Plan and Water Quality Monitoring Plan

Howard Hanson Dam AWSP  
2005 Mitigation and Restoration Sites Construction

May 13, 2005



**TETRA TECH, INC.**  
1925 POST ALLEY  
SEATTLE, WA 98101  
PHONE: 206.728.9655



**FINAL CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN  
AND WATER QUALITY MONITORING PLAN**

**FOR**

**HOWARD HANSON DAM AWSP  
2005 MITIGATION AND RESTORATION SITES CONSTRUCTION**

**U.S. ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT**

Prepared by: Tetra Tech Inc.  
Seattle, Washington  
Contract # DACA67-02-D-2009  
Delivery Order # 17

May 13, 2005





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## **1.0 INTRODUCTION**

This Construction Stormwater Pollution Prevention Plan is an environmental management and permitting support document for the Howard Hanson Dam – Additional Water Storage, Fish Habitat Restoration construction projects scheduled for the summer of 2005.

### **1.1 Background**

The Howard Hanson Dam Additional Water Storage Project (HHD-AWSP) is a project to raise the pool level of the reservoir behind HHD to provide additional water storage for municipal and industrial water supply for the City of Tacoma and for ecosystem restoration and fisheries enhancement purposes. The reservoir pool will be raised in two phases and this project addresses habitat mitigation and restoration projects associated with the Phase 1 HHD pool raise construction project.

As part of the overall project, several mitigation and restoration projects are included to compensate for the adverse environmental effects of the pool raise and for the continued operation of HHD. The Howard A. Hanson Dam (HHD) Additional Water Supply fish and wildlife habitat projects are intended to mitigate for fish and wildlife habitat lost to the increased elevation of the reservoir in 2006, or restore lost or damaged habitat due to the construction and continued operation of HHD since 1962. The conceptual mitigation and restoration projects were initially developed during the feasibility study (AWSP Feasibility Report/EIS) in 1998. The mitigation projects proposed for construction in 2005 partially offset habitat impacts caused by the Phase 1 water storage behind HHD. Mitigation is required for inundating 78.2 acres of riparian area and 11.5 acres of stream habitat. The combined area of construction will include 20 acres of upland and riparian zones, and 33 acres of in-water work for placement of LWD for all sites in 2005 and 2006.

In 2005, nineteen separate sites (Table 1) are proposed under the HHD-AWSP Fish Habitat Mitigation and Restoration Project. They are located upstream of HHD and reservoir on the Upper Green River and its tributaries in King County, Washington. (See Figure 1, Vicinity Map). These sites are all located on lands owned by the City of Tacoma in its municipal watershed. Access to the watershed is controlled at the Tacoma Headworks Office, and the public is not allowed.

This Construction Stormwater Pollution Prevention Plan and Water Quality Monitoring Plan (SWPPP/WQP) addresses stormwater and water quality management for the construction of mitigation and restoration features during 2005. This SWPPP is a reference document to guide the Corps Project,

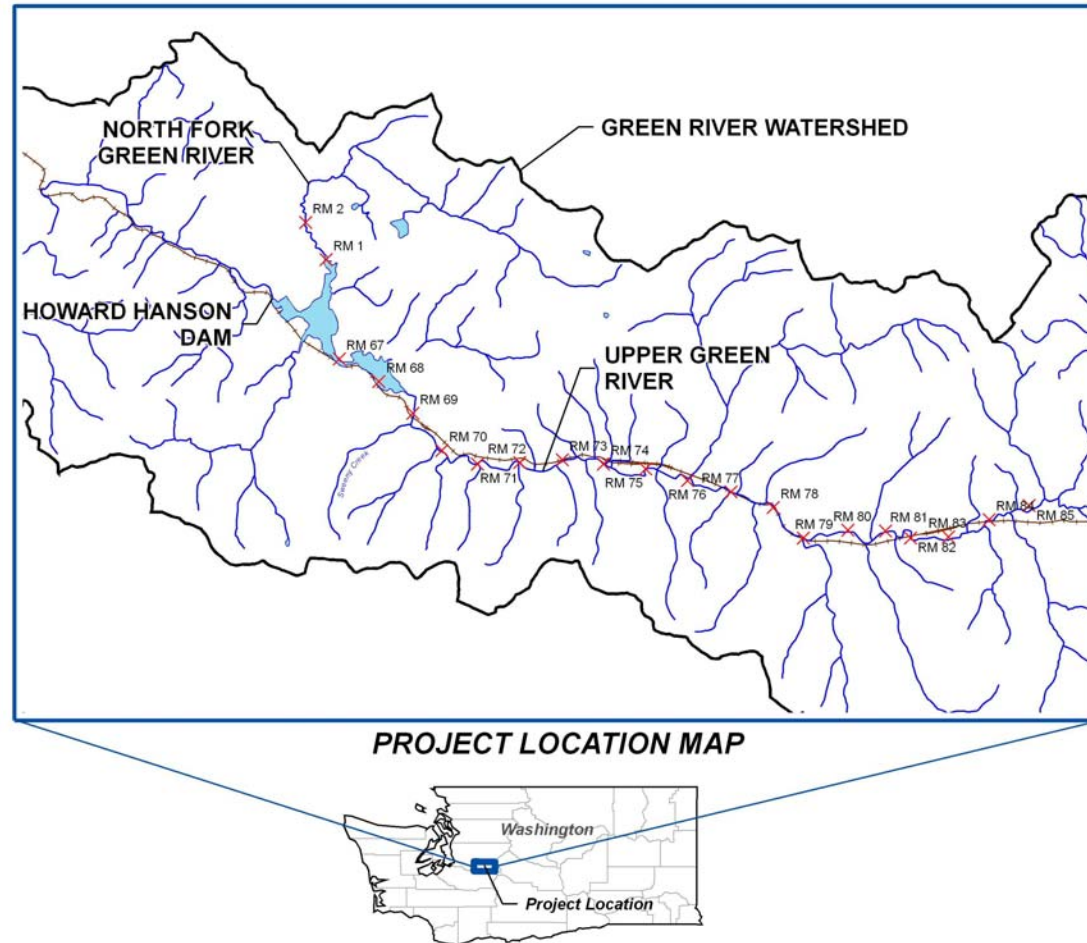
Environmental and Construction managers who are responsible for implementing the HHD-AWSP Mitigation and Restoration projects in 2005.

## **1.2 SWPPP Organization and Content**

This document is a Construction SWPPP that describes the potential for pollution problems at the multiple construction sites herein described. This Construction SWPPP explains and illustrates the measures to be taken on the construction site to control potential pollution problems. This Construction SWPP specifically describes construction practices, stabilization techniques, and structural BMPs that are to be implemented to prevent erosion and minimize sediment transport. This SWPPP/WQMP includes the following:

- Identifies the responsible agency and persons, and a description of their duties, for implementing the SWPPP,
- Overview of permit regulations and SWPPP requirements,
- General descriptions of the project sites, surrounding areas and receiving water bodies,
- Description of project habitat mitigation and restoration features, and construction activities,
- Identification of the types of potential pollutants and source pathways,
- Best Management Practices (BMPs) to minimize pollutant transport and contamination,
- Water Quality Monitoring Plan,
- SWPPP Fact Sheets (Appendix A) that summarize all specific details at each individual site.

**Figure 1. Project Vicinity Map**

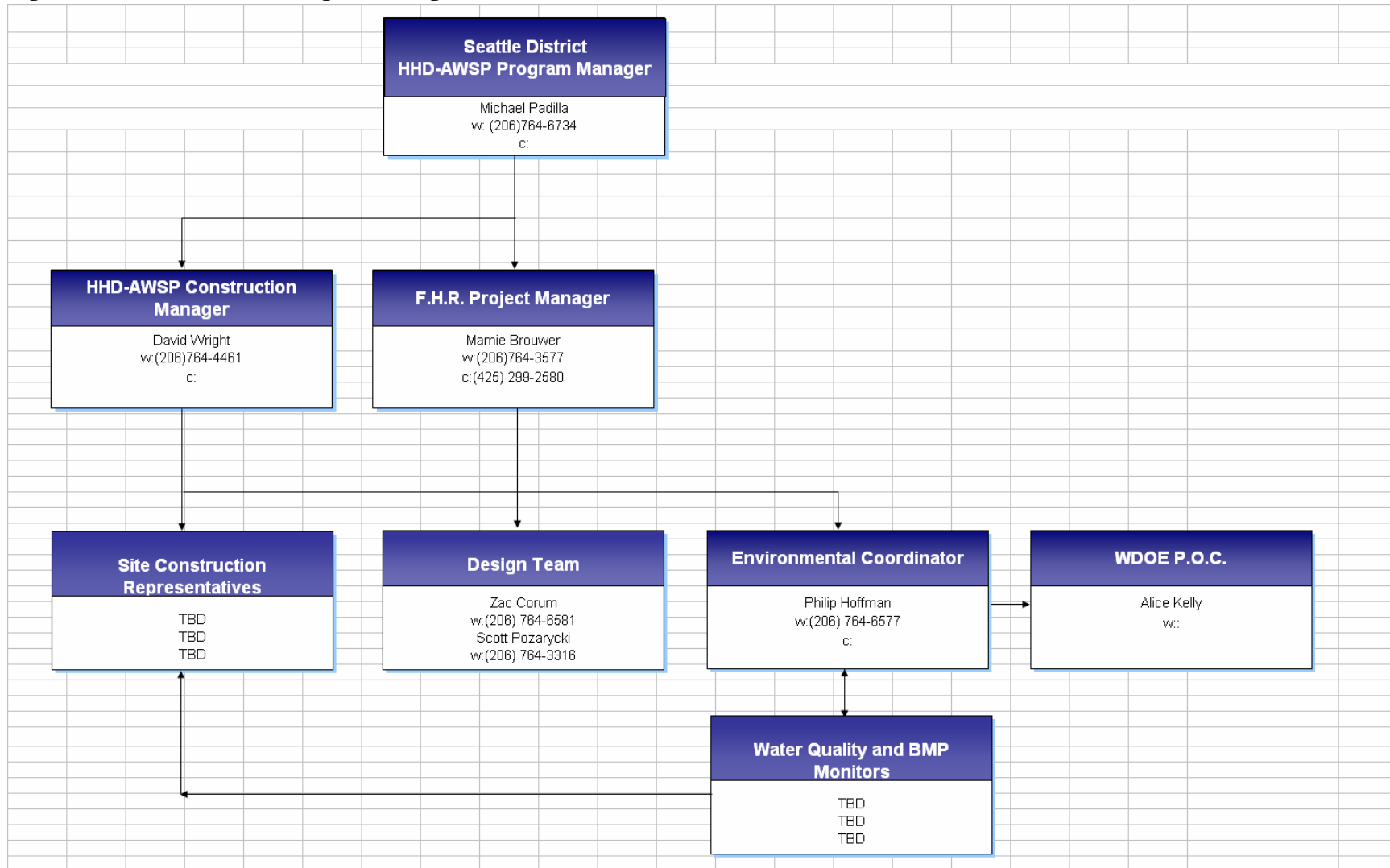


## **2.0 PROJECT ENVIRONMENTAL ORGANIZATION AND RESPONSIBILITIES**

The U.S. Army Corps of Engineers, Seattle District is the agency responsible for the construction and implementation of the Fish Habitat Mitigation and Restoration projects in 2005. Figure 2 is an overview of the organization chart, with respect to environmental management staff and duties. The construction site Environmental Coordinator is Philip Hoffman of the U.S. Army Corps of Engineers, Seattle District (phone number 206-764-6577). Mr. Hoffman's duties include:

- Implement the SWPPP/WQP with the aid of the other members of the construction and SWPPP team,
- Oversee and ensure proper installation and inspection and maintenance of BMPs,
- Conduct water quality monitoring,
- Review water quality monitoring results and implement contingency plans and modify BMPs if necessary,
- Review construction design modifications to determine if plan revisions meet SWPPP, water quality and permit requirements,
- Troubleshoot water quality problems or unanticipated pollutant sources and runoff, and manage water quality during construction,
- Coordinate with and report results to WDOE and other agencies as specified in the Section 401 Water Quality Certification.

**Figure 2. Environmental Management Organization Chart**



### **3.0 PERMIT REGULATIONS AND SWPPP REQUIREMENTS**

The Fish Habitat Restoration construction projects are subject to a variety of permits and regulations. This section of the SWPPP provides an overview of the pertinent regulatory standards and permits needed for the project.

#### **3.1 Water Quality Standards**

The Green River is classified as a Class AA (extraordinary) water body for surface water quality standards. Class AA water bodies are suitable for use as water supply, stock watering, fish and shellfish lifecycles and harvesting, wildlife habitat, recreation, commerce and navigation. The standards for Class AA water bodies are (from WAC 173-201A-030):

*Fecal Coliform.* Fecal coliform organism levels shall both not exceed a geometric mean value of 50 colonies/100 mL and not have more than 10% of all samples exceed 100 colonies/100mL

*Dissolved Oxygen.* Dissolved oxygen shall exceed 9.5 mg/L.

*Dissolved Gas.* Total dissolved gas shall not exceed 110% of saturation.

*Temperature.* Temperature shall not exceed 16 C due to human activities. When natural conditions exceed 16 C, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3 C.

*pH.* pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.2 units.

*Turbidity.* Turbidity shall not exceed 5 nephelometric turbidity units (NTU) over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU. The drinking water standard for turbidity is 5 NTU total.

*Toxics.* Toxic, radioactive, or deleterious materials concentrations shall be below those which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those water, or adversely affect public health.



*Aesthetics.* Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

The primary pollutant of concern for water quality compliance is turbidity from the potential runoff of sediment laden stormwater from upland staging and construction sites and from in-water excavation and pile driving. Fuels and lubricants from the equipment are the secondary pollutants of concern. The water quality monitoring plan is designed to monitor construction activities and provide feedback to the environmental coordinator and construction representatives as they pertain to water quality impacts. Water quality standards must be met to ensure that the City of Tacoma's M&I water supply is below 4.5 NTU at Howard Hanson Dam (USACE, 2002). Downstream from the Dam in the Green River water quality standards, as stated above, will be met to ensure that fish and aquatic invertebrates are not adversely significantly affected by project construction.

### **3.2 Permits and Compliance Required for this Project**

This project requires the receipt of and compliance with several laws, regulations, and permits including:

- National Environmental Policy Act (in compliance via Final EIS prepared for the HHD AWSP)
- Endangered Species Act (in compliance via Biological Opinions prepared by USFWS and NOAA)
- Clean Water Action Section 404 (in compliance via Corps preparation of the 404(b)(1) equivalency analysis)
- Clean Water Action Section 401 Water Quality Certification
- Clean Water Act NPDES Stormwater General Permit for Construction Activities

This SWPPP has been prepared in compliance with the Section 401 Water Quality Certification and the NPDES Stormwater General Permit for Construction Activities. **This SWPPP must be retained on the construction site or within reasonable access at all times to be made available to Ecology and local government agencies upon request.**

In order to show compliance with the requirements of the Section 401 Water Quality Certification and the NPDES Stormwater Permit, this SWPPP must be: 1) fully implemented; 2) adequate to prevent the discharge of toxic pollutants, floating materials, and sediment; and 3) inclusive of all known, available and reasonable means to prevent the discharge of settleable solids and turbidity.

The following permits are not required: 1) Hydraulic Project Approval, because the project is a federal project and is in compliance with the fish habitat enhancement approval; 2) King County Substantial Development Permit, because the project is a federal project and is in compliance with the fish habitat enhancement approval.

This project will have temporary stormwater discharges associated with construction activities, however, it will not result in the construction of any permanent facilities or structures that will have long-term stormwater discharges. Therefore, this is a Construction Stormwater Pollution Prevention Plan only.

#### **4.0 SITE DESCRIPTIONS**

The project consists of a total of 17 sites (Tables 1 and 2) located in the upper basin of the Green River, upstream of Howard Hanson Dam (RM 64.5). Most of the upper basin is within the protected City of Tacoma watershed. There is minimal development in the upper basin.

The upper Green River ranges in elevation from approximately 1,100 ft. to 5,700 ft. at the crest of the Cascade Range. The upper Green River Basin lies within the southernmost portion of the North Cascades ecoregion in the Puget Sound Basin. The North Cascades ecoregion is topographically irregular and is characterized by peaks and valleys shaped by glacial activity. Geology is predominately igneous and metamorphic with some sedimentary rock including 35 to 50 million year-old volcanic andesites and basalts mixed with breccias and tuffs of the Cascades (SCS 1992). These materials are quite erodable, in part because of the large amount of volcanic glass that these rocks contain. This material has been weathered by glacial and alluvial activity and, to some extent, by freezing/thawing processes. Bedrock is exposed in many areas from the scouring by glaciers (USACE, 1997).

Soils are generally formed from the weathering volcanic ash and pumice mixed with older glacial deposits and colluvium. Most soils in the upper basin have developed under coniferous forest on glacial/volcanic material. Some of the lower elevation (<4,500 ft.) soils are quite deep (> 60 inches to bedrock) and most are well drained because of the underlying glacial gravels. In a few locations in the upper basin, the soil has formed from glaciolacustrine sediments. Lacustrine sediments often have low water permeability because of the fine materials that restrict drainage. Along the river and tributary floodplains, the soils are largely formed from alluvium. River terraces in the floodplain were built up from the deposition of material during high flows and are often well drained because of the large size of the material (gravel and cobble).

The average rainfall in this region varies between 50 and 100 inches annually, with lower amounts occurring in the southern extent of the ecoregion. The climate in the basin is a mid latitude, west coast marine type characterized by cool wet winters and mild summers. Approximately 75 percent of the precipitation falls between the months of October and March. At elevations greater than 2,000 ft., much of the precipitation may fall as snow. The major winter and spring flood events are usually associated with a significant snowpack in the upper basin, and a warming trend where heavy rains quickly melt the snow. Most peak flows in the green occur during rain-on-snow events. Over a third of the upper basin is in the rain-on-snow zone (USFS, 1996).

Average annual precipitation at Howard Hanson Dam, WA, is approximately 89 inches per year (USACE, 2001), with up to 100 inches per year occurring in the upper Green River Watershed. Cumulative rainfall totals for the construction season of July through September are approximately 1.5 to 3 inches per month. The two year 24-hour precipitation event can be 3.5 inches, the 10-year 24-hour precipitation event can be 4.5 inches, and the 100-year 24-hour precipitation event can be 6.5 inches (King County 1996). Summer rain events are typically due to unstable air masses over the Cascade Mountains and are typical of short duration thunderstorms. Because rainfall is typically low during the summer months, the soil is unsaturated and much of the rainfall is absorbed by the soils and does not runoff. Compacted soils and cleared areas associated with construction activities have a higher likelihood of contributing stormwater runoff.

Natural vegetation in the North Cascades ecoregion is dominated by mountain hemlock, subalpine fir, and Engelmann spruce in the higher elevations, and western hemlock, Douglas fir and Pacific silver fir dominating the overstory in the lower elevations. Subdominants in the lower elevations include western red cedar (ACOE 1997). The upper Green River Basin lies primarily in the historic boundaries of the Mt. Baker-Snoqualmie National Forest and has been extensively logged. Much of the vegetation is now second or third-growth mixed deciduous and coniferous forest with dominant species including Douglas fir, big leaf maple, red alder, and western red cedar. Specific site descriptions and maps for all 17 sites are included in Appendix A. Specific information includes: site location and area; description of construction staging, access, and features (upland and in-water); soils; vegetation; drainage pathways; critical areas; adjacent areas; receiving waterbody; and potential pollutant sources.

**Table 1. Proposed Mitigation Sites for 2005**

1. TRI-1.3 North Fork Green River
2. MSI-06 Sweeny Creek
3. MSI-06 Welcher's Field East
4. MSI-06 Maywood Creek
5. MSI-06 Nagrom Quarry
6. MSI-06 Hot Springs Hotel
7. MSI-06 Road 5900, Milepost 5.5
8. MSI-06 6-Mile Washout
9. MSI-06 Lester Reload Site

**Table 2. Proposed Restoration Sites for 2005**

1. MSI-05 Humphrey Site
2. TRI-02.2 Charley Creek
3. TRI-02.2 Gale Creek
4. TRI-02.2 Upper McDonald Creek
5. TRI-02.2 Cottonwood Creek
6. TRI-02.2 Piling Creek
7. TRI-01.2 North Fork Ponds
8. MSI-04 Lower McDonald Creek

## **5.0 SUMMARY OF MITIGATION, RESTORATION AND CONSTRUCTION FEATURES**

There are two general areas where the construction projects occur, upland areas that are above the ordinary high water mark (OHWM) and in-water construction areas below the OHWM. This section of the report describes the construction activities occurring in each of these areas.

### **5.1 Upland Area Construction Features and Activities**

Construction Access: Site access routes typically follow old logging and maintenance roads. Construction activities will include clearing, grubbing and salvage of large woody debris along the access route, and placement of road base materials and 4-inch to 6-inch quarry spalls cover along a 15 foot wide road. Site reclamation will include removal of quarry spalls, hydroseeding and planting with native riparian vegetation.

Staging Areas: Staging areas are located near existing roadways and site access routes. Staging areas will provide space for storing equipment and materials, act as equipment refueling areas, and one area will have helicopter wood loading. Construction activities will include clearing, grubbing and salvage of large woody debris along the access route, and placement of road base materials and 4-inch to 6-inch quarry spalls cover along a 15 foot wide road. Site reclamation will include removal of quarry spalls, regrading the site to match natural drainage, hydroseeding and planting with native riparian vegetation.

Road Removal: This part of the project includes excavation of historic roadways that block natural drainage and side channels. Spoils will be disposed of within the project footprint in areas away from natural drainage and side channel areas.

## **5.2 In-water (Below OHWM) Construction Features and Activities**

Construction Access: Access to individual habitat features will be gained by moving equipment and materials along dry gravel bars and riverbed areas, as well as crossing wetted areas of the river. River travel and access will use dry, unvegetated areas to the maximum extent possible, while minimizing travel and crossings in wet areas. Entrance and exit ramps from the river will use 18-inch quarry spalls and riprap to clear soils from equipment tires and tracks. The spalls will be removed, regrading, hydroseeding, and planting will be done upon completion of the project.

Engineered Log Jams: Three types of engineered log jams will be constructed for the project; bar-apex jams, meander jams, and barb jams. These jams emulate different jam structures that are naturally found in the river environment. Construction of these jams generally includes access to wetted areas of the river, transporting construction materials, assembly and installation of the jams in the river. The approach for constructing these jams has been developed to minimize the adverse environmental effects. All jams will be constructed by first using piles as the primary anchors, then excavating if necessary to meet pile design depths, and finally using boulder anchors if pile driving is unfeasible.

Bar Apex Jams Type-1B: These bar apex jams involve driving 2-3 timber piles into the riverbed, placement of 3 large wood pieces (key members) between the piles and lash to the piles depending upon field engineering findings, and place several pieces of large woody debris upstream from key members and piles as rack materials. No in-water excavation is planned for these features and pile driving is considered the Best Management Practice (BMP) for controlling potential pollution from turbidity.

Bar Apex Jams Type-2B: These bar apex jams involve driving 4-6 timber piles into the riverbed, placement of 5 large wood pieces (key members) between the piles and lash to the piles depending upon field engineering findings, excavate 130 cubic yards of riverbed material in rootball and scour areas on the upstream side of the jam, place excavated riverbed materials as ballast on the back of the jam, and place several pieces of large woody debris upstream from key members and piles as rack materials. In-water excavation is used on this type of jam and specific in-water Best Management Practices (BMPs) will be employed for construction of these features (See section 7.0).

Bar Apex Jams Type-1A: These bar apex jams involve connecting 3 anchor rocks to 3 key members each, excavate 90 cubic yards of riverbed material in rootball and scour areas on the upstream side of the jam, lash the key members together, place excavated riverbed materials as ballast on the back of the jam, and place several pieces of large woody debris upstream from key members and piles as rack materials. In-water excavation, anchoring using epoxy, bolts and metal chains are used on this type of jam. Specific in-water Best Management Practices (BMPs) will be employed for construction of these features (See section 7.0).

Bar Apex Jams Type-2A: These bar apex jams involve connecting 3 anchor rocks to 5 key members each, excavate 130 cubic yards of riverbed material in rootball and scour areas on the upstream side of the jam, lash the key members together, place excavated riverbed materials as ballast on the back of the jam, and place several pieces of large woody debris upstream from key members and piles as rack materials. In-water excavation, anchoring using epoxy, bolts and metal chains are used on this type of jam. Specific in-water Best Management Practices (BMPs) will be employed for construction of these features (See section 7.0).

Meander Jams: The meander jams involve excavation of a series of 3 key trenches in the riverbank from the toe of the bank back 35 feet into the bank, placement of 13 pieces of wood in the key trenches and along the bank of the channel, lashing wood together depending upon field conditions, placing anchor rock on key areas of the jam, and backfilling excavated materials on the floodplain area over the key trench. In water excavation will be minimal and key trench materials will be pulled back from the river towards high ground. Specific in-water BMPs will be employed for construction of these features (See section 7.0).

**Barb Jams:** The barb jams involve excavation of a single key trench in the riverbank from the toe of the bank back 35 feet into the bank, placement of 8 pieces of wood in the key trench and along the bank of the channel, lashing wood together depending upon field conditions, placing anchor rock and pin logs on key areas of the jam, and backfilling excavated materials on the floodplain area over the key trench. In water excavation will be minimal and key trench materials will be pulled back from the river towards high ground. Specific in-water BMPs will be employed for construction of these features (See section 7.0).

**Loose Large Woody Debris Placement:** Loose large woody debris will be placed in strategic locations throughout all of the project sites by transporting the wood on site and placing using loaders, skidders, excavators and helicopter. Approximately 200 to 300 pieces of loose large woody debris will be placed as part of the project.

**Side Channel and Pond Excavations:** Excavation of side channel deposits and ponds in floodplain areas will be performed. Side channel excavations will be above the summer time low water elevations and will not be directly connected to river flow paths. Excavated materials will be placed and spread along the floodplain and bank areas adjacent to the side channel areas. Pond excavations will be performed in a similar manner. Stream flow will likely be present during the summer months. The inlet and outlets to the ponds will be excavated in a manner to leave a sediment plug between the stream and pond areas until the final stages of the project when the inlet/outlet areas will be breached.

### **5.3 Additional Construction Activities**

In addition to construction of the Fish Habitat Mitigation and Restoration projects, there are other ongoing activities planned or underway in the upper watershed during the summer of 2005. The additional construction projects are:

- Howard Hanson Dam – Additional Water Storage, Fish Passage Facility (no in-water construction planned for 2005)
- Tacoma Public Utilities – Tributary Culvert Replacement Projects
- Tacoma Public Utilities – Wildlife habitat mitigation project construction projects at Nagrom, Gold Creek, Friday Creek, McCain Creek, Mile Post 10, and North Fork.
- Private landowner timber harvests on both the north and south sides of the Green River except during fire closures.

## **6.0 SUMMARY OF POTENTIAL CONSTRUCTION STORMWATER POLLUTANTS**

The types of activities are similar at all of the proposed construction sites. The following section of the report is a summary of the types of pollutants, their sources, and their regulatory classification (Tables 3 and 4). Two distinct types of construction will occur at nearly every site: 1) upland equipment access, staging, and grading or excavation; and 2) in-water placement of LWD and ELJs. Table 3 is a summary of the potential pollutants associated with the major construction activities on the project. The table characterizes the construction activity, the types of pollutants, and the potential for contamination of the watershed. The contamination potential is a characterization that qualitatively assesses the amount of work in any certain areas, the types of equipment being used, the types of pollutants and potential for contamination if a spill or accident happens. The three categories of contamination potential are (-) no pollution contamination potential, (○) minimal contamination potential, and (●) high pollution contamination potential. Table 4 is a summary of the work activities and pollutant regulatory categories. The table shows that the primary pollutant categories of concern are turbidity and toxics. The monitoring plan is oriented around these two general areas of concern.



**Table 3. Summary of potential pollutants from construction activities**

Area	Activity	Type of pollutant							
		Sediment, runoff and turbidity	Fuels and lubricants	Hydraulic fluids	Glue	Chains, ropes, hardware	Plastic containers	Road base material	Biological pollutants
Upland	Temporary staging	○	●	●	●	●	●	●	-
	Temporary access	●	●	●	-	-	-	●	-
	Pond excavation	○	○	○	-	-	-	-	-
	Historic fill excavation	○	○	○	-	-	-	-	-
	Finish grading, road removal	○	●	●	-	-	-	●	-
	Landscaping	-	-	-	-	-	●	-	-
In-water	Access construction	●	●	●	-	-	-	●	○
	In-water travel	○	○	○	-	-	-	-	○
	Placement of LWD	○	○	○	-	-	-	-	○
	ELJ pile driving	○	○	○	●	●	-	-	○
	ELJ excavations	●	○	○	-	-	-	-	○
	Pond/channel connection excavations	●	○	○	-	-	-	-	○

- no pollution contamination potential
- minimal pollution contamination potential
- higher pollution contamination potential

**Table 4. Summary of potential regulatory pollutants**

Area	Activity	Type of pollutant						
		Fecal Coliform	Dissolved Oxygen	Dissolved Gas	Temperature	Turbidity	Toxics	Aesthetics
Upland	Staging	○	-	-	-	○	○	-
	Access roads	-	-	-	-	○	○	-
	Pond excavation	-	-	-	-	○	○	-
	Historic fill excavation	-	-	-	-	○	○	-
	Finish grading, road removal	-	-	-	-	○	○	-
	Landscaping	-	-	-	-	-	-	-
In-water	Access construction	-	-	-	-	○	○	-
	In-water travel	-	-	-	-	○	○	-
	Placement of LWD	-	-	-	-	○	○	-
	ELJ pile driving	-	-	-	-	○	○	-
	ELJ excavations	-	-	-	-	●	○	-
	Pond/channel connection excavations	-	-	-	-	●	○	-

- no pollution potential
- minimal pollution potential
- higher pollution potential

## **6.1 Upland Potential Pollutants**

Activities that will take place in the uplands include staging of equipment and materials; clearing, grubbing, grading, and placement of rock for access roadways; excavation of ponds and connections of side channels and placement of excavated material; removal of roadways after construction; finish grading; hydroseeding and revegetation.

Temporary Staging: Staging areas will generally be located in previously cleared areas, such as roadway pullouts, utility corridors, or other cleared grassy areas. In a few locations, clearing of trees and shrubs may be necessary. Equipment is likely to be excavators, bulldozers, log loader, log skidder, pile driver/cranes, air compressors, construction materials and debris, and a helicopter for placement of LWD in tributaries. Materials will include pieces of LWD, pilings, boulders, marine chain, rope, anchor bolts, glues, and fuels and lubricants for the equipment. Potential contaminants that could runoff staging areas during a storm would be soil (suspended solids, turbidity), glues, fuels, and lubricants, materials used during construction, and sanitary waste. The pathways for pollutants are seepage into groundwater and along natural drainage paths.

Temporary Access: Temporary access will be constructed at each of the sites. Some locations have existing dirt or previously rocked/graveled access roadways available for access. Clearing may be required for abandoned roadways. In other locations, an access roadway will be cleared, grubbed, and graded with a dozer and crushed rock laid down in areas with wet soils or poor drainage. Potential pollutants are soils, fuels and hydraulic fluids if they are spilled on the access road and then there is a rainfall runoff event. The pathways are seepage into the groundwater and along natural drainage paths.

Pond/Channel Excavation: In areas where ponds or channels will be excavated, the access roadway will be constructed up to the site and a construction pad placed with 4 inch minus spalls. Clearing and grubbing of excavation areas may be required. Excavation will occur in areas isolated from flowing water and will be connected to the river/creek channel at the very end of construction.(see in water activities). Excavated material will be placed around the perimeter of the channel or pond feature and will be hydroseeded and planted. Potential contaminants that could runoff of excavated areas during a storm would be soil with rainfall runoff. The pathways for pollutants are seepage through groundwater and drainage to the river through the inlet/outlet connections.

Roadway Fill Excavation: Some sites will include excavation of abandoned road or railroad fill and at all

sites, rock placed for site access will be scraped up at the end of construction. All material excavated from roadways will be placed into trucks and hauled off-site to an upland disposal site (such as a nearby quarry). Potential pollutants are soils, fuels and hydraulic fluids if they are spilled on the access road and then there is a rainfall runoff event. The pathways are seepage into the groundwater and along natural drainage paths.

Finish Grading: Following construction of site features, all disturbed areas and roadways will be finish graded to eliminate piles of materials, holes, and remove roadway ballast. Potential pollutants are soils, fuels and hydraulic fluids if they are spilled on the access road and then there is a rainfall runoff event. The pathways are seepage into the groundwater and along natural drainage paths.

Site Seeding and Revegetation: Following the finish grading, all sites will be hydroseeded with a native grass and forb mix within 72 hours. Revegetation of disturbed areas or specific planting areas will be planted during the period from October 1 through December 31<sup>st</sup> following construction. Mulch will be imported to spread around all plantings. Potential contaminants that could runoff of the site during seeding or revegetation would be soil, mulch, fuels, lubricants and hydraulic fluids, and plastic containers. The pathways for pollutants are along natural drainage channels.

## **6.2 In-water Potential Pollutants**

Activities that will take place in-water or below the OHWM of the river or creeks include access and driving equipment on gravel bars and across the channel, pile driving for ELJ construction, excavation for ELJ construction, placement and connecting wood in the ELJs, placement of loose LWD along the channel, backfilling and grading excavated materials, and excavation of pond and side channel connections.

Driving Equipment Below OHWM: Equipment will be driven on and work will be conducted on gravel bars and channel margins, as well as crossing the river in shallow riffles to construct ELJs and place LWD. Potential contaminants include soil (turbidity, suspended solids) from excavation and substrate disturbance, and fuels, lubricants and hydraulic fluid from the equipment.

Placement of Loose LWD: Placement of loose LWD will occur using excavators and log loaders in the water, or by helicopter. Minimal excavations will be used for a portion of LWD. Placement of LWD will only minimally disturb the substrate. Potential contaminants include soil (turbidity, suspended solids) from excavation and substrate disturbance, and fuels, lubricants and hydraulic fluid from the equipment.

Pile Driving Associated with ELJs: Construction of the ELJs uses pile driving equipment in wetted areas of the channel. Driving piles creates minor amounts of turbidity due to disturbance of the channel bed. Potential contaminants include soil (turbidity, suspended solids) from excavation and substrate disturbance, and fuels, lubricants and hydraulic fluid from the equipment.

Excavation and Backfill Associated with ELJs: To construct some of the ELJs, excavation and backfilling will occur. For barb and meander jams, excavation will occur primarily in the river bank outside of the water, and has the potential to create higher levels of turbidity during stormwater runoff. For point jams and other ELJs, excavation may occur on gravel bars, or within the wetted channel, and will create less turbidity. Potential contaminants that could enter the water bodies include soil (turbidity, suspended solids), fuels, lubricants, glues, chain, rope, and anchor bolts.

Pile Connections: A portion of the ELJs will require chain or rope connections to the piles. There will be minimal disturbance from connecting wood to the driven piles. Potential contaminants fuels, lubricants and hydraulic fluid from the equipment, glue from anchor bolt installation, and ropes, chains and bolts from the construction materials.

Pond/Channel Excavations and Connections: Excavation of sediment plugs is planned as a separate activity to connect ponds and channels to the main channel. In some locations this will occur out of the wetted channel and in some locations this will occur within the wetted channel. There is the potential to create higher levels of turbidity from this activity. Potential contaminants that could enter the water bodies include soil (turbidity, suspended solids), fuels and lubricants and hydraulic fluids.

#### Suspended Sediment Management

The goal of the following suspended sediment management discussion is to establish monitoring criteria and general turbidity thresholds that will allow for continued water supply for the City of Tacoma and meet permit requirements.

The background conditions of the Green River for turbidity are typically less than 50 NTU during the construction season and the 5 NTU standard is the metric for measuring turbidity exceedance during construction. The proposed approach for monitoring and managing turbidity of the project is to employ in-water best management practices including construction sequencing, use of specialized construction

equipment and building methods, and isolation and diversion where higher turbidity activities are expected.

It is important to note that construction is planned upstream from the Howard Hanson Dam reservoir. The reservoir will mix, trap and settle suspended sediments and act as a settling pond for the project. The reservoir is a turbidity BMP for water quality by protecting downstream reaches from turbidity pollution. Downstream from the reservoir, 4.5 miles, the Tacoma water supply is withdrawn at the Tacoma Headworks facilities. Therefore it is important that the waters of the reservoir not exceed drinking water turbidity standards, while providing sedimentation and pollutant control protection to the project.

A simple mixing and settling model was developed to estimate threshold levels of turbid water entering the reservoir from the mainstem Green River and North Fork project areas, to meet permit requirements and minimize adverse effects to City of Tacoma drinking water supply operations. The primary issue for suspended sediment management is maintaining turbidity levels below 3.5 NTU at the Tacoma Headworks water supply intake. The City adds freshwater from the North Fork wellfield and blends to 3.5 NTU. Typical background turbidity readings range from 1.5 to 2.0 NTU during dry conditions, and 2.5 to 2.0 NTU for rainy conditions at the outlet of HHD (Valentine, 2005).

For the purposes of the model, a 4.5 NTU level was selected as the whole lake, average turbidity level threshold where problems could be expected downstream from HHD. A starting value of 2.0 NTU is used as the background lake concentration. The turbidity pool ranges between 1,065 and 1,075 feet. The upper elevation of 1,075 feet is used in the model as a conservative elevation for run of the river storage operations in the model. Once the turbidity pool elevation is reached, run of the river operations are used in the model. The model was run using hydrology from a low flow water year, 1985 for the fish habitat construction window, July 15 through Oct. 15. The model was used to determine incoming turbidity levels that would cause whole lake average turbidity to increase above 4.5 NTU.

#### Settling and Trapping

The model was used to estimate settling and trapping of sediment within the reservoir. The primary assumptions for the model is that settling is for silt fractions only, and that silt is 50% of the material disturbed during construction that is placed into suspension. This is a conservative assumption and the material disturbed during construction likely has a higher concentration of silts and lower concentration of clays. Silt fraction settling estimates used the sedimentation index developed by Churchill(1948). The sedimentation index for Howard Hanson Dam reservoir was estimated using the following parameters.

Average Storage Volume (July – Sept) = 13,572 acre-ft

Daily Average Inflow = 74.2 cfs

Reservoir Length = 3.2 miles

The sedimentation index indicates a 90% removal efficiency of silt sized sediments, which is 45% of the total incoming material from the above assumptions of a 50/50 split between silt and clay fractions. It is assumed that turbidity is directly proportional to the concentration of fines and clays. Consequently 45% of the incoming turbidity is removed from inflow (silts settling), and the remaining material is subject to the mixing portion of the model. Sediment sampling of planned excavation areas may show different size composition of riverbed substrates. This information can be used to update the model and revise turbidity monitoring thresholds.

#### Mixing

A volumetric analysis method was used to determine the effects of turbid inflow from the mainstem Green River and North Fork tributary on reservoir turbidity levels. A simple mixing and dilution model was developed that approximates the effect of mixing and dilution of the reservoir. Equation 1 is the equation used to estimate the reservoir concentration and turbidity levels.

$$\text{Equation 1. } C_{res(t2)} = \frac{(V_{res} C_{res})_{t1} + (V_{greenin} C_{greenin})_{t2} + (V_{northin} C_{northin})_{t2} - (V_{resout} C_{resout})_{t2}}{(V_{res})_{t2}}$$

Where,

$V_{res}$  = Volume of the reservoir during summertime conservation (acre-ft)

$C_{res}$  = Relative concentration of the reservoir (NTU)

$V_{greenin}$  = Volume of the mainstem Green River inflow (acre-ft)

$C_{greenin}$  = Relative concentration of the mainstem Green River inflow (NTU)

$V_{northin}$  = Volume of the tributary North Fork inflow (acre-ft)

$C_{northin}$  = Relative concentration of the North Fork inflow (NTU)

$V_{resout}$  = Volume of the tributary North Fork inflow (acre-ft)

$C_{\text{resout}}$  = Relative concentration of the North Fork inflow (NTU)

$t_1$  = calculation at first timestep

$t_2$  = calculation at second timestep

### Model Results

Modeling results indicate that an average daily inflow turbidity threshold of 10 NTU, for the entire construction period, for both the mainstem Green River and North Fork confluence monitoring locations is an appropriate target (Appendix E). Exceeding this threshold on an average daily basis has the potential to create cumulative increases in turbidity that could exceed the whole lake average concentration of 4.5 NTU, and potentially affect the downstream water supply withdrawals.

Another threshold scenario evaluated was to determine the maximum weekly average turbidity threshold. This evaluation showed that one week of daily average values of 80 NTUs causes whole lake turbidity levels to rise near the 4.5 NTU standard. Weeks having significant work activities should remain below 80 NTU. If this value is approached, then all follow on work must remain below the 10 NTU standard for the remainder of the project until high flows flush the river and reservoir system.

A final threshold analysis scenario was the evaluation of the single day maximum turbidity threshold of 250 NTU. This evaluation showed that one daily average value of 250 NTU would cause whole lake turbidity levels to rise near the 4.5 NTU standard. A single day value should remain below 250 NTU. If this value is approached, then all follow on work must remain below the 10 NTU standard for the remainder of the project until high flows flush the river and reservoir system.

A final observation is related to the period when the reservoir reaches the turbidity pool and storage is held constant, and there is minimal mixing and sedimentation. At this stage, the 10 NTU – average daily, 80 NTU – average weekly, and 250 NTU – single day turbidity levels will likely cause exceedance of the 4.5 NTU whole lake average because the reservoir has little sediment mixing and settling capabilities at this point.

Overall, the model results show that significant disturbances from construction activities should be scheduled with the following goals:

- minimize overlapping turbidity pulses,
- reduce highly elevated levels of turbidity,



- provide breaks in construction if high turbidity levels are encountered,
- track turbidity, discharge and reservoir pool throughout the duration of the project and evaluate the cumulative effects on the reservoir and water supply,
- understand that as the reservoir stage approaches the turbidity pool level, the reservoir has less capacity to provide suspended sediment mixing, dilution and settling.

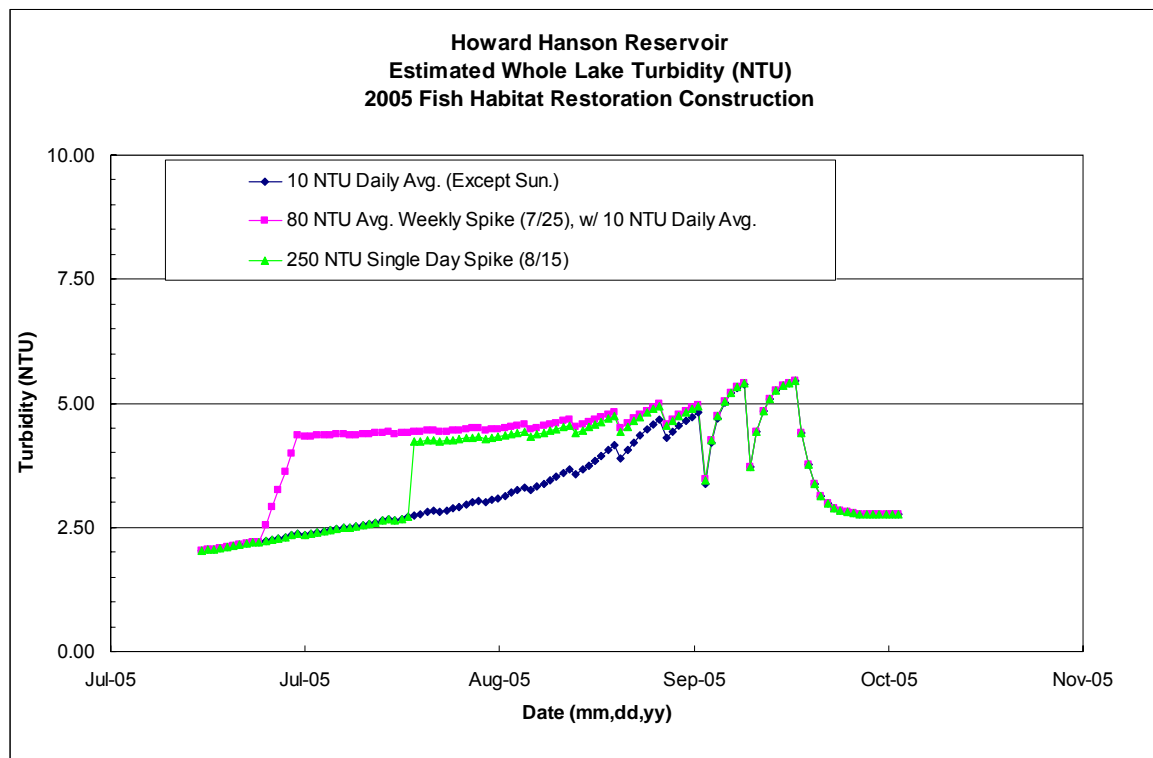


Figure 3. Whole Lake Turbidity Estimates from Various Tributary Loading Scenarios

## 7.0 SUMMARY OF CONSTRUCTION SWPPP CONTROLS AND BEST MANAGEMENT PRACTICES

Construction stormwater BMPs are separated into two categories, upland BMPs and in-water BMPs. This section of the report describes the recommended BMPs including general installation requirements, techniques, and project sequence and scheduling. Additionally this section provides a hierarchical guide for in-water BMP selection depending on field conditions. Appendix A contains site specific recommendations for upland/in-water BMPs.

Typical installation details when applicable for the BMPs listed below are contained in Appendix D. Additional installation guidelines and techniques can be found in the *Stormwater Management Manual for Western Washington, Vol. II* (WA DOE, 2001). When applicable, upland BMPs shall be installed prior to construction activities to ensure maximum effectiveness.

## **7.1 Upland Area Best Management Practices**

Upland BMPs are derived from the *Stormwater Management Manual for Western Washington* and shall be installed accordingly with construction activities described above in Section 5. The recommended upland BMPs for construction are as follows:

### **Primary Upland BMPs**

#### **1. Preservation of Natural Vegetation**

Prior to construction, areas where natural vegetation can be preserved will be marked using high visibility flagging or fencing. Trees of significance will be flagged and preserved when possible. Access roads shall be constructed to promote minimizing the project footprint and avoiding key vegetation and species, rather than removal.

#### **2. Construction Access and Staging Area Stabilization**

Stabilization of access roads, parking areas, staging areas, and other onsite vehicle transportation routes immediately after initial grading reduces erosion caused by construction traffic or runoff. Stabilization should include a 4 to 6-inch depth of 2- to 4-inch crushed rock, gravel base, or crushed surfacing base course shall be applied immediately after grading. Whenever possible, construction roads and parking areas shall be placed on a firm and compact subgrade. Construction access and staging areas will have quarry spalls and roadbase materials removed at the end of the project. The remaining areas will be hydroseeded per the landscaping plan.

In some cases, construction access has been significantly minimized by planning to use helicopters for placement of large wood debris, instead of moving materials with heavy equipment on the ground. This will eliminate the need to travel up and down the streambed, thereby minimizing impacts to the channel and potential pollutant runoff.

#### **3. Staging Area Containment**

All staging areas will be constructed in a manner to contain spills and fueling by isolating sites and minor grading for drainage into isolated areas such as swale features and traps.

#### **4. Emergency Spill Cleanup Kits**

Fuels or lubricants spilled onto the ground will immediately be cleaned up using the emergency spill kit which contains items including oil absorbent pads, shovels, gloves, heavy duty disposal bags, disposal containers and drums. Refer to Specifications Section 01563 Pollution Control for additional information.

#### 5. Hydroseeding and native vegetation replanting

Hydroseeding is anticipated at all disturbed areas upon completion of the project. Site specific hydroseeding may be used during construction if exposed areas are of a particular concern for erosion and runoff that cannot be treated using other BMPs. Hydroseed will use soil tackifiers and native plant mixes to stabilize exposed areas.

#### 6. Loose straw

Loose straw will be used on all disturbed areas, as an intermediate erosion control measure, prior to hydroseeding. All exposed areas shall be covered with loose straw at the end of each working day.

#### 7. Drainage Channel Protection

Drainage channels in upland areas that have the potential to input sediments from disturbed areas will be protected using a variety of BMPs. These spot BMPs are designed to check flow, deposit and filter sediments at the source prior to transport to the receiving water bodies. The selected BMP is at the discretion of the Construction Representative and Environmental Coordinator as to which BMP is appropriate for the site. The following BMPs will be used at the site for source stabilization and drainage channel protection.

Straw Wattles - Straw or coir wattles may be used to control, divert, and slow sheet flows toward the river. These should be installed after road edges are pulled back following construction, but before hydroseeding and native plantings have grown in. Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length. The wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes.

Drainage Swales and Check Dams – Drainage swales and check dams are topographic features that intercept flowing water and either divert it to sediment control areas, or reduce flow velocities, cause sedimentation and promote sediment filtration through soils within the channel. These features are installed within drainage channels and span across the entire width of the drainage channel. Swales will be installed on flatter slopes and check dams on steeper slopes.

Straw Bales – Straw bales decrease the velocity of sheet flows and intercept and detain

small amounts of sediment from disturbed areas of limited extent, preventing sediment from leaving the site, straw bale barriers shall be installed when applicable to deflect flows prior to entering the river. Bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales shall be either wire-bound or string-tied. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings.

8. Silt Fence – Silt fence will be used as a secondary measure along the extent of the access roadway and construction areas only if drainage and runoff cannot be controlled using crushed rock, drainage swales and wattle BMPs to control source pollution. They will be installed along full extent of the downslope of roads, staging areas, and the river where sheet flow may occur causing sediment erosion problems and effectively isolate the site from erosion and sediment runoff. Additionally silt fencing may be used in the channel to create a filter for suspended sediment and quiescent areas around work sites.

## **7.2 In-water Best Management Practices**

In-water BMPs are measures intended to minimize the effects of in-water construction on water quality and attempt to meet the state water quality regulatory standards. No standard documentation exists for in-water BMPs. Several in-water Best Management Practices will be employed for managing potential pollution and turbidity issues related to the project.

### **Primary In-water BMPs**

#### 1. Construction Schedule

All in-water work shall be conducted during the approved fish window. In-water work shall be defined as work below the OHWM designated for a channel, reach, or tributary. For all sites within the mitigation and restoration projects, the approved work window is Aug. 1 through Sept. 31 of any calendar year. Variances have been provided by WDFW for July 15-July 30 and Oct. 1-Oct. 15. All in-water work shall be planned prior to start to minimize the time equipment is in the water, the number of trips or movements necessary to complete the work, and the amount and type of temporary structures or materials to place and remove during construction.

#### 2. Construction equipment, methods and sequencing

All equipment working below the OHWM shall, to the extent practicable, use non-toxic, vegetable based, biodegradable hydraulic fluids during all in-water work.

### 3. Construction Equipment Cleaning

All equipment, including heavy machinery, hand tools, wading boots and monitoring equipment will be coordinated with Bryan King, TPU Watershed Supervisor (253) 502-8808.

### 4. Construction Access

All construction entrances to the river will be constructed using crushed rock and quarry spalls. This will eliminate the quantity of fine material tracked into the river on equipment treads. The construction entrance and exit areas will be removed from the channel and area reclaimed following completion of construction.

### 5. Emergency Spill Cleanup Kits

A floating absorbent boom, or other suitable oil boom, will be located at each construction site. Oil, lubricant, hydraulic fluid and epoxy spills require stopping work, deployment of the boom, clean up of the spill, identification of the source and fixing the leak. The contractor shall provide spill kits at each location with materials suitable for containing and removing the type of fluids which may be accidentally discharged from the equipment in use.

### 6. Construction Methods

Pile driving installation is preferred over in-channel excavation. The pile driver will be placed on a blast-mat of recycled tires for stability and not a gravel pad. Pile driving will proceed at a rate to minimize turbidity in the river. When in-channel excavation is required, then secondary in-water BMPs will be implemented.

An additional construction method considered as a BMP to reduce impacts to the channel is the use of helicopters for large wood debris placement, rather than the traditional methods using excavators, skids and loaders moving along the channel. Using helicopters allows for the reduction of heavy equipment travel up and down the stream.

### **Secondary In-water BMPs**

#### 7. Water control

The primary goal of installing an in-water coffer and isolation system is to deflect flows away from the construction area and isolate the turbidity caused from excavation from river flows. River currents passing directly over an exposed excavation will not only scour fines from the surface of the exposed material, but also carry fine material out from the pore spaces between larger bed materials. Therefore, the

structures examined for the BMP must have flow deflection capabilities to create a hydraulic shadow for the work area, be sealed flush with the riverbed, and be enclosed on all sides to effectively isolate the construction area (See Appendix C). The proposed in-water BMPs include the following:

- Log wingwall deflector w/ plastic sheeting and floating turbidity curtain
- Ecology blocks deflector w/ plastic sheeting and floating turbidity curtain
- Hydraulic dam w/ floating turbidity curtain

If in-channel excavation is required, then one of these measures will be installed, to be selected by the contractor.

## **8.0 WATER QUALITY MONITORING PLAN (WQMP)**

This section describes the proposed construction water quality monitoring plan to ensure compliance with water quality standards at the project monitoring locations. Specific items covered include construction scheduling, construction area river reaches, monitoring locations, monitoring methods and equipment, reporting, monitoring response actions and contingency plans.

### **8.1 Construction Schedule**

Construction will occur at all sites during the summer and fall of 2005. In-water work will occur during the fish window from August 1 through September 31<sup>st</sup> per agreement with WDFW. An extension of the fish window to allow construction in-water from July 15 through October 15 is being requested from WDFW. Work in the upland areas will begin in June and final revegetation will occur between October 1<sup>st</sup> and December 31<sup>st</sup>.

The intent is that up to 5 sites will be under construction at any one time during the construction period and in-water work window. The projects are grouped into sets of projects based on their locations along subreaches of the river and reservoir areas (Figure 2). The construction schedule is flexible and will change depending upon individual progress at each site. Therefore, the monitoring plan is flexible in identifying the monitoring activities and subreach based monitoring locations. Monitoring locations are recommended at locations to characterize the upstream background conditions for the project, at the downstream ends of each construction subreach, and ultimately downstream from HHD and the reservoir settling and mixing pool.

## **8.2 Monitoring Locations**

Visual inspections are performed at each individual construction site, as well as seven predetermined water quality monitoring stations. Individual construction site monitoring will evaluate BMPs, fuel, lubricant and oil spills, and construction waste products; whereas the predetermined water quality monitoring stations will evaluate turbidity by collecting and analyzing samples. Each of the individual sites will be visited daily and inspected for fuel and lubricant pollution during as well as BMP implementation and function.

Water quality monitoring locations are arranged to capture background turbidity control information at locations upstream from the project sites for both the mainstem Green River and the North Fork Green River. Intermediate monitoring points are located at the downstream extent of project subreaches and in the reservoir. The downstream monitoring location is the control point below HHD. Table 5 provides a summary of the project river reaches, all monitoring locations, and the individual projects corresponding to each of the monitoring locations.

## **8.3 Monitoring Procedures**

### Level 1 - General Turbidity Monitoring, Reporting and Actions

Turbidity will be monitored using a portable turbidimeter that is equivalent and can be calibrated to the City of Tacoma, Hach Turbidimeter – 2100 (or equivalent). The meter should be calibrated daily to read from 0-100 NTUs, prior to collecting samples.

Samples will be taken three times daily (one hour prior to construction, mid-day between 11:00 am and 1:00 pm pdt, and one hour after construction) at the monitoring locations shown in Figure 2. Turbidity measurement will be taken along the thalweg of the channel, if feasible, and 0.5 feet below the surface of the water. Turbidity shall not exceed 5 nephelometric turbidity units (NTU) over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU. Background turbidity measurements will reference the upstream control points, GR-US, NF-US and GR-DS, per Table 5. All monitoring data will use the form included in Appendix B to record measurements and report to the environmental coordinator. Monitors will note daily calibration, periodic turbidity readings, compare them to background readings, identify the current construction activities occurring at the site.

### Level 2 – Initial Turbidity Exceedance Monitoring and Actions

Level 2 monitoring procedures are implemented if turbidity monitoring reveals exceedance measurements

at the designated downstream monitoring locations (GR-DS, NF-DS, HHD-DS) having readings more than 5 NTUs (for < 50 NTU background condition), or 10 percent (for >50 NTU background condition).

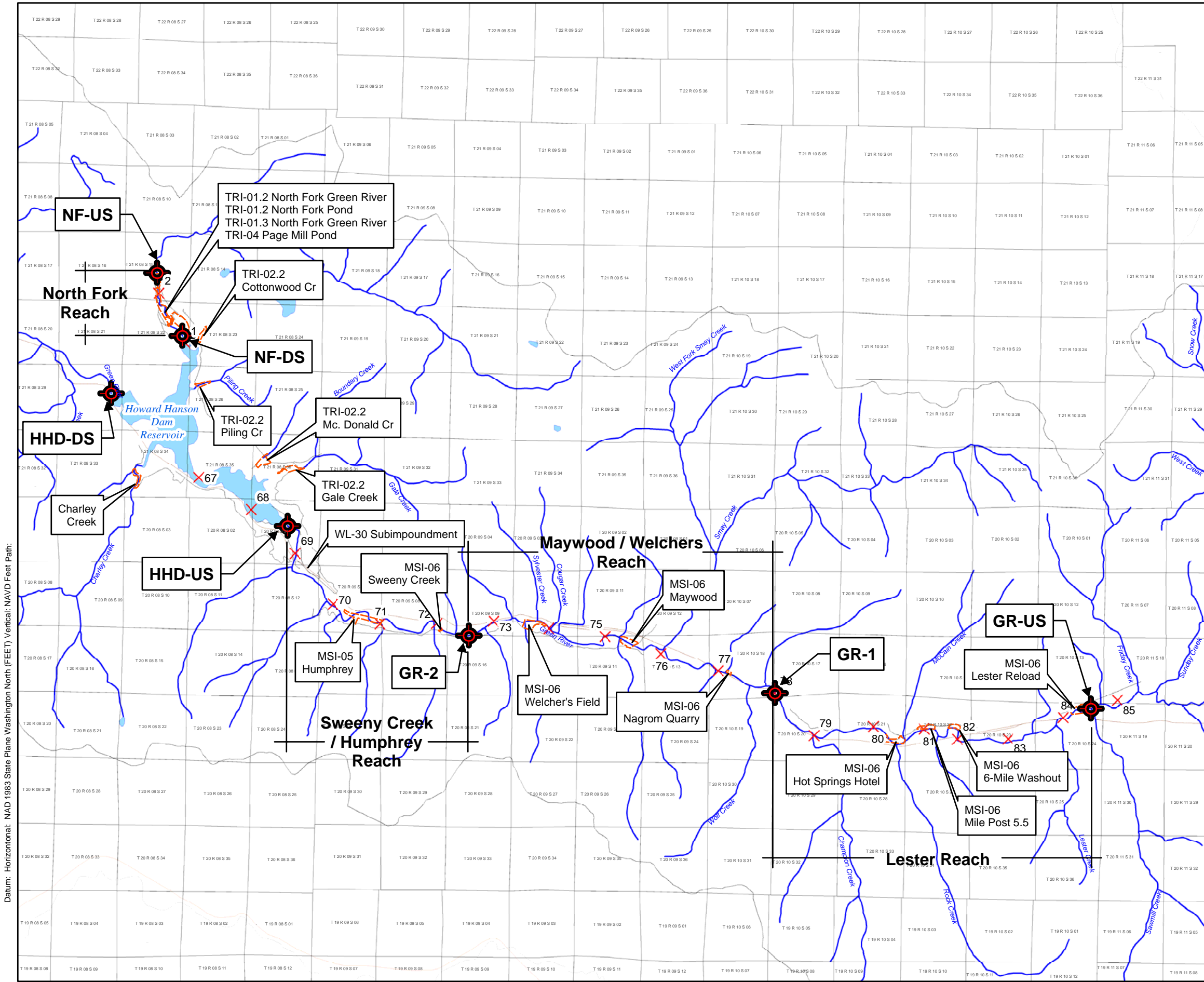
Level 2 Initial Turbidity Exceedance Monitoring will include hourly monitoring at the closest downstream monitoring point from the exceedance area, while continuing Level 1 monitoring activities at all other locations. The goal of Level 2 monitoring at this point is help determine which site, or if the cumulative activities on a reach are causing problems. It may be difficult to determine where the exceedance is originating from. The best approach is to review the Level 1 Monitoring Results along the entire reach to see if one site has readings higher compared to others.

The environmental monitor is responsible for reporting the exceedances to the construction representatives working in the reaches upstream from the exceedance monitoring point. The construction representatives will then evaluate site BMPs to determine if simple corrective measures can be taken to alleviate the problem, and slow construction activities if there are too many activities. The environmental coordinator will continue to monitor subsequent Level 2 hourly results, reported to them by the monitors, to determine if there is a continuing problem. If the problem persists, then Level 3 monitoring procedures are implemented. If turbidity levels drop back below the upstream threshold numbers, then the monitoring crew reverts back to Level 1 General turbidity monitoring protocols, and reports this information back to the construction representative.







**Table 5. HHD AWSP 2005 Fish Habitat Restoration Project Reaches and Monitoring Location Information**

River Reach	Monitoring Point Reach Location	Monitoring Point ID	Location	Mitigation and Restoration Projects w/in Monitoring Reach
Howard Hanson Dam Reservoir (RM 64.5 - RM 69.0)	Upstream	GR-DS	Upstream end - HHD reservoir pool, downstream end Green River @ RM 68.5	Tributary - TRI-2.2 Cottonwood Creek Tributary - TRI-2.2 Piling Creek Tributary - TRI-2.2 McDonald Creek Tributary - TRI-2.2 Gale Creek Tributary - TRI-2.2 Charley Creek
	Downstream	HHD-DS	Downstream - @ Howard Hansen Dam, RM 64.5	
North Fork Green River (RM n/a)	Upstream	NF-US	Upstream - 100' u/s of TRI-1.3 N. Fork Green River	TRI-01.3 Upper North Fork Green River TRI-01.2 Lower North Fork Green River TRI-01.2 North Fork Pond
	Downstream	NF-DS	Downstream - Confluence of N. Fork Green and HHD Reservoir	
Sweeny Creek / Humphrey Reach (RM 68.5 – RM 72.5)	Upstream	GR-2	100 feet Upstream of Sweeny Creek @ RM 72.5	MSI-05. Humphrey MSI-06. Sweeny Creek
	Downstream	GR-DS	Upstream end - HHD reservoir pool, downstream end Green River @ RM 68.5	
Maywood / Welcher's Reach (RM 72.5 – RM 78.0)	Upstream	GR-1	100 feet Upstream of Lester Rd. Nagrom Site @ RM 78.0	MSI-06. Welcher's Field MSI-06. Maywood MSI-06. Nagrom Quarry.
	Downstream	GR-2	Upstream of Sweeny Creek @ RM 72.5	
Lester Reach (RM 78.0 – RM 85.5)	Upstream	GR-US	100 feet Upstream of Lester Airport @ RM 85.5	MSI-06. Hot Springs Hotel MSI-06. Road 5900 MP 5.5 MSI-06. 6-Mile Washout MSI-06. Lester Reload Site.
	Downstream	GR-1	Upstream of Lester Rd. Nagrom Site @ RM 78.0	



Datum: Horizontal: NAD 1983 State Plane Washington North (FEET) Vertical: NAVD Feet Path:

**Legend**

-  Water Quality Monitoring Location
-  Existing Road
-  River Mile
-  Project Footprint
-  Green River Watershed

Monitoring Point ID	Location	Mitigation and Restoration Projects w/in Monitoring Reach
HHD-US	Upstream - HHD reservoir pool, RM 68.5	Tributary - TRI-2.2 Cottonwood Creek Tributary - TRI-2.2 Piling Creek Tributary - TRI-2.2 McDonald Creek Tributary - TRI-2.2 Gale Creek Tributary - TRI-2.2 Charley Creek
HHD-DS	Downstream - Howard Hansen Dam, RM 64.5	
NF-US	Upstream - 100' u/s of TRI-1.3 N. Fork Green River	TRI-01.3 Upper North Fork Green River TRI-01.2 Lower North Fork Green River TRI-01.2 North Fork Pond TRI-04 Page Mill Pond
NF-DS	Downstream - Confluence of N. Fork Green and HHD Reservoir	
GR-1	Upstream of Sweeney Creek, RM 72.5	WL-30. Sub-impoundments MSI-05. Humphrey MSI-06. Sweeny Creek
HHD-US	Upstream - HHD reservoir pool, RM 68.5	
GR-2	Upstream of Lester Rd. Nagrom Site, RM 78.0	MSI-06. Welcher's Field MSI-06. Maywood MSI-06. Nagrom Quarry.
GR-1	Upstream of Sweeney Creek, RM 72.5	
GR-3	Upstream of Lester Airport, RM 85.5	MSI-06. Hot Springs Hotel MSI-06. Road 5900 MP 5.5 MSI-06. 6-Mile Washout MSI-06. Lester Reload Site.
GR-2	Upstream of Lester Rd. Nagrom Site, RM 78.0	



TACOMA WATER, TACOMA  
PUBLIC UTILITIES  
City of Tacoma, WA



U. S. Army Engineer District, Seattle  
Corps of Engineers  
Seattle, Washington

HOWARD A. HANSON DAM AWSP  
FISH HABITAT RESTORATION PROJECT

WATER QUALITY MONITORING LOCATIONS

KING COUNTY, WA

SIZE 11x17	FILE NAME monitoring_location.mxd	DATE 1 APR 2005	PLATE N/A
DSGN.	D CLINE / J NODOLF	CHK.	SHEET N/A



### Level 3 – Persistent Turbidity Exceedance Monitoring and Actions

Level 3 turbidity monitoring and actions are implemented when three consecutive measurements exceed the NTU standard (1- Level 1 General Turbidity Measurement and 2 – Level 2 Initial Turbidity Exceedance Monitoring hourly measurements).

When Level 3 Persistent Turbidity Exceedance Monitoring is implemented, the Environmental Coordinator and Construction Representative are both informed and will meet immediately at the problem construction site. Actions taken by the Environmental Coordinator and Construction Representative are to immediately stop work, assess the problem and implement secondary levels of BMPs and contingency plans. These plans will be documented and reported to the WDOE. Hourly monitoring will continue during Level 3 actions while construction activities are restarted. Once turbidity falls to acceptable levels then Level 1 – General Monitoring Schedule will be implemented.

If, after implementation of all reasonable erosion/sediment control BMPs and contingency measures, and the hourly turbidity monitoring still indicates exceedance of water quality standards, then the Environmental Coordinator will notify WDOE that water quality standards cannot be met, summarize all BMPs implemented to date, and suggest revised construction methods, BMPs and project approach. The environmental coordinator and construction representative will then implement revised BMPs and contingencies per the correspondence with the WDOE, and re-start the project. Hourly monitoring will continue throughout this process until monitoring results indicate the BMP and construction method revisions have been effective at reducing turbidity levels.

### General Fuel and Lubricant Monitoring

Fuel and lubricants will be monitored by visual observation daily at each construction site. The Corps Construction Representative is responsible for monitoring for fuels and lubricants at the project site during all construction operations. Environmental monitors will inspect the site once daily at a random time.

If any visible sheen is observed at the site at any time, then the machinery will be pulled from the water, shut down, repaired, and use of an absorbent boom or clean up kits to contain the spills will be implemented. The booms will be placed spanning the channel approximately 100 feet downstream of the construction site. If any fuels or lubricants are spilled onto the ground, they will immediately be cleaned up with absorbent pads and vermiculite. The use of detergents to disperse oily sheens is not acceptable.

### Upland Construction Stormwater BMP Maintenance and Inspection

Visual inspections of all cleared and graded areas of the construction site will be performed daily and within 12 hours of the end of a storm with rainfall amounts greater than 0.5 inches. The inspection will be conducted by the environmental monitor and reported to the environmental coordinator using the monitoring data sheet. The inspection will verify that the structural BMPs described above are in good condition and are minimizing erosion and stormwater runoff from upland areas. Any problems will be noted on the monitoring data sheet, and reported to the construction representative and environmental coordinator. Consecutive reports of BMP problems that are not addressed within 24 hours will be flagged for additional inspection by the environmental coordinator.

### Waste Monitoring

Visual inspections will be performed at each construction site to check on proper disposal of all waste associated with the project. This includes disposal of construction materials, as well as human wastes. Improper handling or disposal of waste materials will be noted on daily monitoring sheets and reported to the construction representative and environmental coordinator. Consecutive reports of improper waste disposal that are not addressed within 24 hours will be flagged for additional inspection by the environmental coordinator.

## **8.4 Reporting**

All monitoring activities will be recorded on a daily monitoring sheet (See Appendix B) for each project grouping or individual site. The monitoring sheets will be provided to the Environmental Coordinator at the end of each day, and a summary memorandum will be provided at the end of each construction week. The Environmental Coordinator will provide a summary of monitoring results and any additional BMPs implemented, weekly to WDOE. The Environmental Coordinator will contact WDOE if water quality standards cannot be met and all reasonable BMPs have been implemented, and further consultation between the agencies will ensue. The Environmental Coordinator will provide a final programmatic construction monitoring report to Corps Management and WDOE within 60 days of completion of construction at all sites.

## **8.4 Employee Training**

An employee training meeting will be held prior to construction to educate construction representatives and environmental monitoring staff about the requirements and expectations of the SWPPP. The Environmental Coordinator is responsible for implementation of training prior to construction and monitoring activities begin. The meeting will include background on the components and goals of the

SWPPP and hands-on training for upland and in-water BMP installation and maintenance, spill prevention, response, good housekeeping, proper material handling, disposal and control of waste, equipment fueling, and proper storage, washing, and inspection procedures. Training will also include environmental protocols for working in the TPU watershed.

## REFERENCES

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- King County Department of Natural Resources. 1996. Draft Surface Water Design Manual. Seattle, WA.
- Simons, D.B., Senturyk, F.S., 1992. Sediment Transport Technology, Water and Sediment Dynamics. Water Resources Publications.
- U.S. Army Corps of Engineers (USACE). 1997. Green/Duwamish River Basin, General Investigation Ecosystem Restoration Study Reconnaissance Phase. Seattle District.
- U.S. Army Corps of Engineers (USACE). 2001. Howard A. Hanson Dam, Water Control Manual.
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- U.S. Forest Service (USFS). 1996. Green River Watershed Analysis. North Bend Ranger District, Mt. Baker-Snoqualmie National Forest.
- U.S.G.S. 2005. Green River Streamgage Near Lester, Average Monthly Statistics.  
[http://nwis.waterdata.usgs.gov/wa/nwis/monthly/?site\\_no=12104500](http://nwis.waterdata.usgs.gov/wa/nwis/monthly/?site_no=12104500)
- Valentine, Marian (USACE) 2005. Personal Communication – Re: Typical turbidity readings during July to September in Howard Hanson Dam reservoir.
- Washington State Department of Natural Resources (WA DNR). 2000. Forestland Soil Survey, Geographic Information System data.  
<http://www3.wadnr.gov/dnrapp6/dataweb/metadata/soils.htm>
- Washington Department of Ecology (WA DOE), 2001. Stormwater Management Manual for Western Washington.

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<b>IN THE MATTER OF GRANTING A</b>	) <b>ORDER # 2509</b>
<b>WATER QUALITY</b>	) <b>Corps Reference No. PL-05-03</b>
<b>CERTIFICATION TO</b>	) Construction of engineered log jams and habitat
<b>U.S. Army Corps of Engineers</b>	) features for mitigation and rehabilitation
in accordance with 33 U.S.C. 1341	) associated with the Howard Hanson Dam
FWPCA § 401, RCW 90.48.120, RCW	) Additional Water Storage Project, located
90.48.260 and Chapter 173-201A WAC	) upstream of Howard Hanson Dam, King County,
	) Washington.

TO: Philip L. Hoffman  
U.S. Army Corps of Engineers  
Planning Branch  
PO Box 3755  
Seattle, WA 98124-2255

On April 15, 2005, a public notice for a proposed water quality certification from the State of Washington was distributed for the above-referenced project pursuant to the provisions of 33 U.S.C. 1341 (FWPCA §401). The proposed project entails construction of habitat features, including engineered log jams and large wood placement, to enhance fisheries habitat. The purpose of the project is to restore and increase Chinook salmon spawning and rearing habitat that has been impacted by the Howard Hanson Dam.

**2005 Green River and North Fork log jam and excavation sites**

Upper North Fork TRI-1.3	Requires in-water construction
Sweeney Creek	No in-water construction
Welchers Field East	Requires in-water construction
Maywood	Requires in-water construction
Nagrom	No in-water construction
Hot Springs	Requires in-water construction
Lester MP 5.5	Requires in-water construction
6 Mile Washout	Requires in-water construction
Lester Reload	Requires in-water construction
North Fork Ponds	Requires in-water construction
Humphrey	Requires in-water construction
Loose wood placement at RM 60	No in-water construction

**Helicopter LWD placement sites**

Cottonwood Creek	No in-water construction
Piling Creek	No in-water construction
McDonald Creek	No in-water construction
Gale Creek	No in-water construction
Charley Creek	No in-water construction

**AUTHORITIES:**

For purposes of this Order, the term "Applicant" shall mean the U.S. Army Corps of Engineers and its agents, assigns, and contractors.

In exercising authority under 33 U.S.C. 1341, 16 U.S.C. 1456, RCW 90.48.120, and RCW 90.48.260, Ecology has investigated this application pursuant to the following:

1. Conformance with applicable water quality-based, technology-based, and toxic or pretreatment effluent limitations as provided under 33 U.S.C. Sections 1311, 1312, 1313, 1316, and 1317 (FWPCA Sections 301, 303, 306 and 307);
2. Conformance with the state water quality standards as provided for in Chapter 173-201A WAC authorized by 33 U.S.C. 1313 and by Chapter 90.48 RCW, and with other appropriate requirements of state law; and
3. Conformance with the provision of using all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.

**CONDITIONS OF ORDER # 2509 AND WATER QUALITY CERTIFICATION:**

In view of the foregoing and in accordance with 33 U.S.C. 1341, RCW 90.48.120, RCW 90.48.260 and Chapter 173-201A WAC, water quality certification is granted to the Applicant subject to the following conditions:

**A. No Impairment of Water Quality:**

- A1. The Green River is classified as Class AA waters of the state. Certification of this proposal does not authorize the Applicant to exceed applicable state water quality standards (Chapter 173-201A WAC) or sediment quality standards (Chapter 173-204 WAC). Water quality criteria contained in WAC 173-201A-030(1) and WAC 173-201A-040 shall apply to this project, unless otherwise authorized by Ecology. Furthermore, nothing in this certification shall absolve the Applicant from liability for contamination and any subsequent cleanup of surface waters or sediments occurring as a result of project construction or operations.

**B. Short Term Modification to Water Quality Standards:**

- B1. Construction activities waterward of the ordinary high water mark may cause water quality effects that will exceed the state water quality criteria specified in Chapter 173-201A WAC. Per WAC 173-201A-110, Ecology may grant a modification to the standards to allow for exceedances of the criteria on a short-term basis when necessary to

accommodate essential activities. The Green River is classified as Class AA and the criteria of that class apply except as specifically modified by this Order. Turbidity in Class AA waters shall not exceed 5 NTU over background when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

- B2. Mixing zones (or zones of disturbance) can be authorized to allow for temporary exceedances of certain water quality standards in state waters immediately adjacent to a permitted project, after all known, available, and reasonable methods of prevention, control and treatment have been implemented. For this project, a mixing zone of 600 feet from the downstream edge of the in-water activities is considered reasonably sufficient to allow for temporary water quality exceedances. Within the mixing zone, the Class AA standard for turbidity is waived. All other applicable water quality standards shall remain in effect within the mixing zone and all other water quality standards are to be met outside of the authorized mixing zone.
- B3. This modification shall remain in effect for the entire duration of time necessary to complete the work. However the waiver of specified standards within the mixing zone is intended for brief periods of time (such as a few hours or a day) and is not an authorization to exceed those standards for the entire duration of construction. In no case does the waiver authorize degradation of water quality that significantly interferes with or becomes injurious to characteristic water uses, including fisheries habitat, or causes long-term harm to the Green River.

**C. Notification Requirements and Start-of-Construction Meeting:**

- C1. At the initiation of construction activities requiring river crossings, the Applicant shall hold an on-site meeting with the project manager, appropriate Corps personnel, all necessary construction contractors, and State agency representatives including Department of Ecology and Washington Department of Fish and Wildlife Area Habitat Biologist (Larry Fisher, 425-649-7042). During this meeting, the Area Habitat Biologist will provide direction regarding stream crossings and movement of equipment below the ordinary high water mark. Notification of the meeting shall occur at least 5 working days in advance of the meeting.

**D. Stormwater Management:**

- D1. Construction practices shall comply with the applicable requirements of Ecology's Stormwater Management Manual for Western Washington, February 2005.

**E. Construction:**

- E1. The Applicant shall adhere to the May 23, 2005 Memorandum for Record 2005 Howard Hanson Dam AWSP Fish Habitat Rehabilitation "Proposed Project Specific Construction

Sequences and BMPs" to the extent practicable. Variations in sequence or BMPs are allowed if the variation results in equivalent or reduced environmental effect or impact.

- E2. Work in or near waters of the state shall be done so as to minimize turbidity, erosion, and other water quality impacts. Construction stormwater, sediment and erosion control Best Management Practices (BMPs) suitable to prevent exceedances of state water quality standards (e.g., detention areas, filter fences, etc.), shall be in place before starting clearing and construction at the impact site.
- E3. Equipment used for this project shall be free of external petroleum-based products while working in/near the river. Soil or debris shall be removed prior to work below the ordinary high water line.
- E4. All construction debris shall be properly disposed of on land so that it cannot enter a waterway or cause water quality degradation to state waters.
- E5. Wash water containing oils, grease, or other hazardous materials resulting from wash down of equipment or working areas shall be contained for proper disposal, and shall not be discharged into state waters or storm drains.
- E6. Clean Fill Criteria: Applicant shall ensure that fill (rock, gravel) placed for the proposed project does not contain toxic materials in toxic amounts.
- E7. The Applicant shall implement all specifications for erosion and sediment control specified in the TESC and all contract documents. Adjustments to planned erosion and sediment control may be necessary to successfully control off-site movement of materials.
- E8. Temporary impacts to vegetation shall be limited to the amount necessary for construction, access, and stockpiling/staging areas. These disturbed areas shall be replanted with native vegetation within the first appropriate planting season after construction is completed and maintained or replanted as necessary to ensure 80% survival after three years.
- E9. Periodic inspection and maintenance of all erosion control structures shall be conducted no less than every 7 days from the start of the project to site stabilization. Additional inspections shall be conducted prior to and after expected rainfall events to ensure erosion control measures are in working conditions. Any damaged structures shall be immediately repaired. If it is determined at the inspection that additional measures are needed to control stormwater and erosion, they shall be implemented immediately.
- E10. A contingency plan shall be developed detailing actions to be taken in the event of adverse weather conditions or other foreseeable undesirable conditions.

- E11. Machinery and equipment used during construction shall be serviced, fueled, and maintained on uplands in order to prevent contamination to surface waters. All fueling areas will be provided with adequate spill containment. During fueling and servicing of equipment, BMPs shall be in place to contain any spill of petroleum products.

**F. Emergency/Contingency Measures:**

- F1. In the event the Applicant is unable to comply with any of the permit terms and conditions due to any cause, the applicant shall:
- Immediately take action to stop, contain, and clean up unauthorized discharges or otherwise stop the violation and correct the problem.
  - Notify Ecology of the failure to comply. Spill events shall be reported immediately to Ecology's 24-Hour Spill Response Team at (425) 649-7000, and within 24 hours to Ecology's Federal Permit Coordinator at (425) 649-7129.
  - Submit a detailed written report to Ecology within five days that describes the nature of the violation, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.

Compliance with this condition does not relieve the applicant from responsibility to maintain continuous compliance with the terms and conditions of this Order or the resulting liability from failure to comply.

- F2. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent spills into state waters. No refueling of equipment shall occur over, or within 50 feet of the river.

**G. Notification**

- G1. Applicant shall provide notice to Ecology's Federal Permit Coordinator Rebekah Padgett at least 3 days prior to the start of construction. Notification can take place by e-mail to [rpadd461@ecy.wa.gov](mailto:rpadd461@ecy.wa.gov), telephone to (425) 649-7129, fax to (425) 649-7098, or in writing.

**H. General Conditions:**

- H1. This certification does not exempt and is provisional upon compliance with other statutes and codes administered by federal, state, and local agencies.
- H2. The applicant will be out of compliance with this certification if the project is constructed and/or operated in a manner not consistent with the project description contained in the

Public Notice for certification, or as otherwise approved by Ecology. Additional mitigation measures may be required through other local, state, or federal requirements.

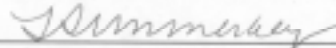
- H3. This Order is valid for a period of not more than five years after the signature dated on the last page of this Order. The Applicant shall reapply with an updated application for certification if five years elapse between the date of the issuance of this Order and the beginning of construction and/or discharge.
- H4. The applicant will be out of compliance with this certification and must reapply with an updated application if the information contained in the Public Notice is voided by subsequent submittals. Any future action at this project location, emergency or otherwise, that is not defined in the Public Notice, or has not been approved by Ecology, is not authorized by this Order. All future actions shall be coordinated with Ecology for approval prior to implementation of such action.
- H5. Copies of this Order shall be kept on the job site and readily available for reference by Ecology personnel, the construction superintendent, construction managers and foremen, and state and local government inspectors.
- H6. To avoid violations or non-compliance with this Order, the applicant shall ensure that project managers, construction superintendents, and other responsible parties have read and understand relevant aspects of this Order and any subsequent revision or Ecology-approved plans.
- H7. The applicant shall provide access to the project site upon request by Ecology personnel for site inspections, monitoring, necessary data collection, or to ensure that conditions of this Order are being met.
- H8. Nothing in this Order waives Ecology's authority to issue additional orders if Ecology determines further actions are necessary to implement the water quality laws of the state. Further, Ecology retains continuing jurisdiction to make modifications hereto through supplemental order, if additional impacts due to project construction or operation are identified (e.g., violations of water quality standards, downstream erosion, etc.), or if additional conditions are necessary to further protect the public interest.
- H9. Liability: Any person who fails to comply with any provision of this Order shall be liable for a penalty of up to ten thousand dollars (\$10,000) per violation for each day of continuing noncompliance.

**Appeal Process:**

Any person aggrieved by this Order may obtain review thereof by appeal, within thirty (30) days of receipt of this Order, to the Washington Pollution Control Hearings Board, P.O. Box 40903, Olympia, WA 98504-0903. Concurrently, a copy of the appeal must be sent to the Department

of Ecology, Shorelands and Environmental Assistance Program, P.O. Box 47600, Olympia, WA 98504-7600. These procedures are consistent with the provisions of Chapter 43.21B RCW and the rules and regulations adopted thereunder.

Dated June 28, 2005 at Bellevue, Washington.



Jeannie Summerhays, Section Manager  
Shorelands and Environmental Assistance Program  
Department of Ecology  
State of Washington

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# 2005 HOWARD HANSON DAM AWSP FISH HABITAT REHABILITATION



## HELICOPTER LWD PLACEMENT (TRI – 02.2) GREEN RIVER, KING COUNTY, WA

### CONSTRUCTION DRAWINGS *September 20, 2005*

SHEET INDEX

SHEET	PLATE	DESCRIPTION
1	G-1	TITLE SHEET
2	G-2	QUANTITIES, NOTES, & ABBREVIATIONS
3	G-3	VICINITY MAP
4	CW-1	COTTONWOOD CK (RD 5500 MP 8.6)
5	CW-2	COTTONWOOD CREEK HELICOPTER LWD PLACEMENT DETAILS
6	CW-3	COTTONWOOD CREEK HELICOPTER LWD PLACEMENT DETAILS
7	PI-1	PILING CK (RD 5500 MP 9.3)
8	PI-2	PILING CREEK HELICOPTER LWD PLACEMENT DETAILS
9	MC-1	UPPER MCDONALD CK (RD 5530-B MP 11.3)
10	GL-1	GALE CK (RD 5530 MP 11.9)
11	GL-2	GALE CREEK HELICOPTER LWD PLACEMENT DETAILS
12	GL-3	GALE CREEK HELICOPTER LWD PLACEMENT DETAILS
13	CH-1	CHARLEY CK (RD 3703 MP 16)
14	CH-2	CHARLEY CREEK HELICOPTER LWD PLACEMENT DETAILS
15	CH-3	CHARLEY CREEK HELICOPTER LWD PLACEMENT DETAILS

SUBMITTED:		
MAMIE S. BROUWER		
PROJECT		MANAGER
REVIEWED:		
DEAN SCHMIDT		
CHIEF,	TECH ENGINEERING AND REVIEW	SECTION
RECOMMENDED:		
OLTON SWANSON, P.E.		
CHIEF,	DESIGN	BRANCH
APPROVED:		
MARK A. OHLSTROM, P.E.		
CHIEF,	ENG. AND CONST.	DIVISION

TITLE SHEET				Scale:
HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT				NO SCALE
 				Plate #: <b>G-1</b>
				Sheet 1 of 15
DESIGNED: Z. CORUM/S. POZARYCKI		DRAWN: Z. CORUM	CHECKED:	

FISH HABITAT WOOD PLACEMENT CONSTRUCTION QUANTITIES

SHEET	LOCATION	LWD 25-30 inch DBH; 50 ft length (including RB)	LWD 20-24 inch DBH; 50 ft length (including RB)	LWD 14-24 inch DBH; 50 ft length (including RB)	LWD 14-24 inch DBH; 25-35+ ft length (including RB)	Stump 20+ inch DBH; 10+ ft length (including RB)	Total large woody debris (LWD)
CW-1	COTTONWOOD CK (RD 5500 MP 8.6)	2	4	8	0	1	15
PI-1	PILING CK (RD 5500 MP 9.3)	2	3	0	0	1	6
MC-1	UPPER MCDONALD CK (RD 5530-B MP 11.3)	0	0	15	11	5	31
GL-1	GALE CK (RD 5530 MP 11.9)	9	6	0	0	0	15
CH-1	TRI-02.2 CHARLEY CK (RD 3703 MP 16)	12	7	0	0	0	19

GENERAL CONSTRUCTION NOTES

- 1) ALL WORK WILL BE CONDUCTED IN SENSITIVE FISH AND WILDLIFE HABITAT. CARE MUST BE TAKEN TO MINIMIZE ADVERSE IMPACTS. USACE WILL IDENTIFY ALL SENSITIVE AREAS NOT TO BE DISTURBED. SITE DISTURBANCE, RIVER BANK MODIFICATION AND VEGETATION REMOVAL SHALL BE MINIMIZED TO THE EXTENT POSSIBLE.
- 2) ALL LWD TO BE PLACED BY HELICOPTER TO MINIMIZE ADVERSE IMPACTS. HELICOPTER MUST BE CAPABLE OF LIFTING AND PLACING THE LARGEST SIZED LOGS IDENTIFIED IN THE QUANTITIES TABLE (30 INCH DBH AND 50 FT LONG WITH ATTACHED ROOTBALL). SEE DETAIL SHEETS FOR LWD PLACEMENT DETAILS. PHOTOS OF ALL LWD PLACEMENT LOCATIONS ARE AVAILABLE EXCEPT FOR MCDONALD CREEK.
- 3) ALL LWD PROVIDED BY THE GOVERNMENT AT STAGING AREAS INDICATED ON PLANS. GOVFERNMENT WILL TRANSPORT LWD BETWEEN STAGING AREAS IF NECESSARY.
- 4) STAGING AREAS SHOWN ON SHEET G-3 ARE CONSIDERED SUITABLE FOR LWD STAGING, MAINTENANCE, REFUELING, TAKEOFFS, AND LANDINGS.
- 5) OVERHEAD POWERLINES ARE LOCATED WITHIN 0.1 MILE OF SOME WORK AREAS. NO UNDERGROUND UTILITIES HAVE BEEN IDENTIFIED IN WORK AREAS.
- 6) ALL LOCATIONS AND ELEVATIONS SHOWN ARE APPROXIMATE AND FIELD ADJUSTMENTS ARE EXPECTED.
- 7) CONTRACTOR TO PROVIDE GOVERNMENT WITH PLAN FOR REFUELING OPERATIONS FOR APPROVAL PRIOR TO WORK. HELICOPTER MAINTENANCE AND REFUELING OPERATIONS ARE TO BE CONDUCTED AT APPROVED LOCATIONS ONLY, PER SPECIFICATIONS.

GENERAL T.E.S.C. NOTES (STAGING AREAS ONLY)



- 1) SEE SPEC SECTIONS 01061 AND 01563, AND SWPPP.

GENERAL CONSTRUCTION SEQUENCE NOTES

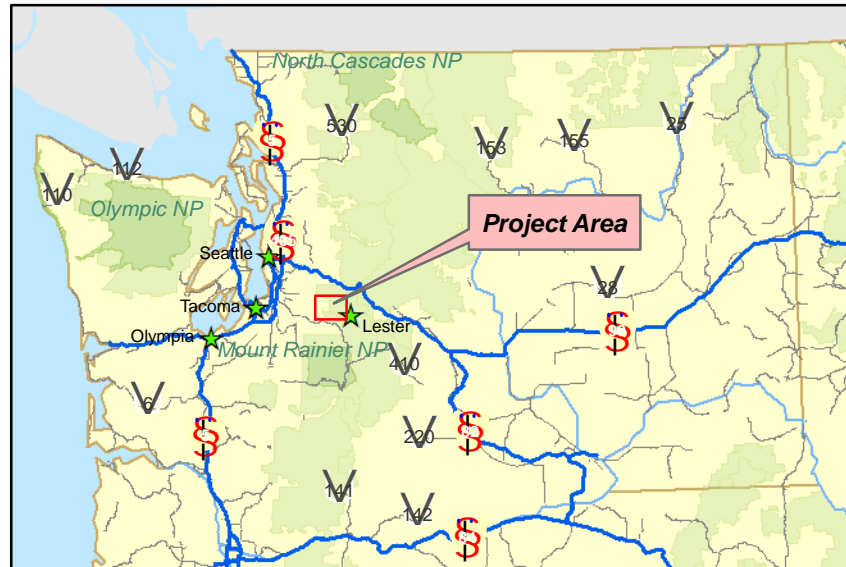
- 1) USACE WILL IDENTIFY AND MARK ALL SENSITIVE AREAS NOT TO BE DISTURBED.
- 2) WITH THE EXCEPTION OF MC DONALD CK., GOVERNMENT HAS IDENTIFIED ALL LOCATIONS ALONG THE STREAMBED FOR LWD PLACEMENT USING FLORESCENT ORANGE FLAGGING. LWD INSTALLATIONS HAVE BEEN SEQUENTIALLY NUMBERED, FROM THE UPSTREAM TO DOWNSTREAM ENDS OF THE WORK LIMIT.
- 3) PLACE LWD PER PLANS, SPECS, AND USACE DIRECTION.

ABBREVIATIONS

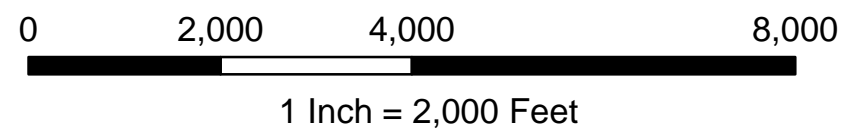
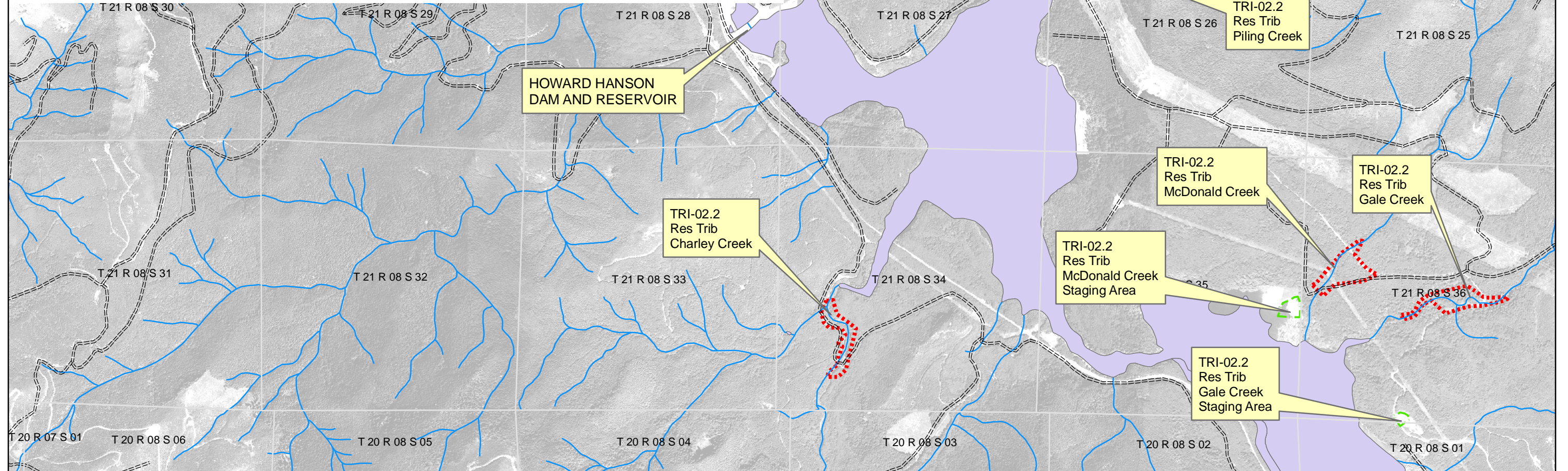
ABBREVIATION	DEFINITION
AWSP	ADDITIONAL WATER STORAGE PROJECT
BNSF RR	BURLINGTON NORTHERN-SANTA FE RAILROAD
CH	CHARLEY CREEK
CK	CREEK
CW	COTTONWOOD CREEK
DBH	DIAMETER OF TREE AT BREAST HEIGHT, NOMINAL DIAMETER OF LOG
EL, & ELEV	ELEVATION (NAVD 1988)
FT	FEET
GL	GALE CREEK
KC	KING COUNTY
LWD	LARGE WOODY DEBRIS
MC	MC DONALD CK
MAX	MAXIMUM
MP	MILE POST
N	NORTH
PI	PILING CREEK
RB	ROOT BALL OF TREE
RD	ROAD
ROW	RIGHT OF WAY
SPEC	SPECIFICATION
TPU	TACOMA PUBLIC UTILITIES
TESC	TEMORARY EROSION AND SEDIMENT CONTROL
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
WA	WASHINGTON



QUANTITIES, NOTES, & ABBREVIATIONS				Scale:
HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT				NO SCALE
				Plate #: <b>G-2</b>
		U.S ARMY CORPS OF ENGINEERS SEATTLE DISTRICT		Sheet 2 of 15
		DATE: 28-SEPT 2005		
DESIGNED: Z. CORUM/S. POZARYCKI		DRAWN: Z. CORUM	CHECKED:	





- Legend**
- Project Footprints
  - Staging Areas
  - Township/Range/Section
  - D River Mile



<b>2005 HOWARD HANSON AWSP FISH HABITAT REHABILITATION</b>		Scale: 1: 24,000
<b>HELICOPTER VICINITY MAP</b>		Plate: <b>G-3</b>
 	U.S. ARMY CORPS OF ENGINEERS SEATTLE DISTRICT	Sheet 3 of 15
	DATE: 20 SEPT 2005	
DESIGNED:	DRAWN: S. JESSE	CHECKED:



Tri-02.2 Cottonwood CK Juxd  
 Part: 016 ASINSWSPAWSPREMITIGATION\_PROJECTS\_2004 GIS SITE DESIGN RESTORATION Part Sheet Tri-02.2 Cottonwood CK Juxd  
 NAD 1983 State Plane Washington North (FEET) Vertical NAVD 83 Feet  
 Datum: Horizontal: NAD 1983 State Plane Washington North (FEET) Vertical: NAVD 83 Feet



## Legend

- Work Limits
- Staging Area
- KC Parcel Boundary
- Existing Road
- Ordinary High Water Line
- \* Loose LWD
- Ex. Ground Contours

## CONSTRUCTION NOTES:

- 1) Place LWD pieces individually, and in clusters, per sheet CW-2 and CW-3, and per USACE direction.
- 2) Actual LWD locations are flagged at ground level.
- 3) All LWD located at wellfield staging area.



TACOMA WATER, TACOMA  
 PUBLIC UTILITIES  
 City of Tacoma, WA



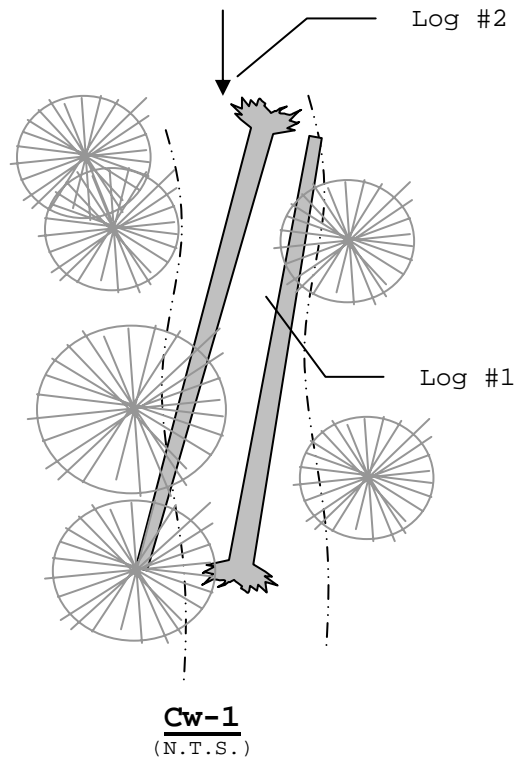
U. S. Army Engineer District, Seattle  
 Corps of Engineers  
 Seattle, Washington

2005 HOWARD HANSON DAM AWSP  
 FISH HABITAT REHABILITATION

TRI-02.2 COTTONWOOD CK  
 RD 5500 MP 8.6, ELEV. 1177-1240  
 KING COUNTY, WA

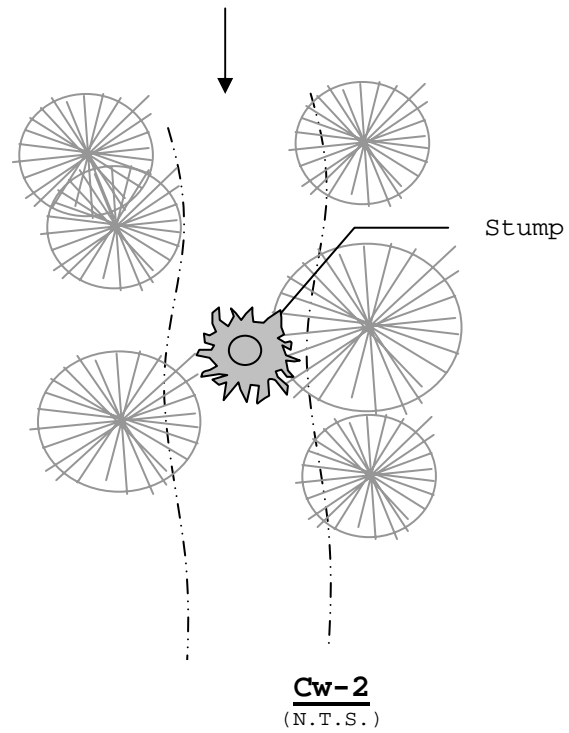
SIZE 11x17	FILE NAME TRI-02.2 Cottonwood CK Juxd	DATE 20 SEPT 2005	PLATE CW-1
DSGN. Z. CORUM / S. POZARYCKI	CHK.	SHEET 4 OF 15	





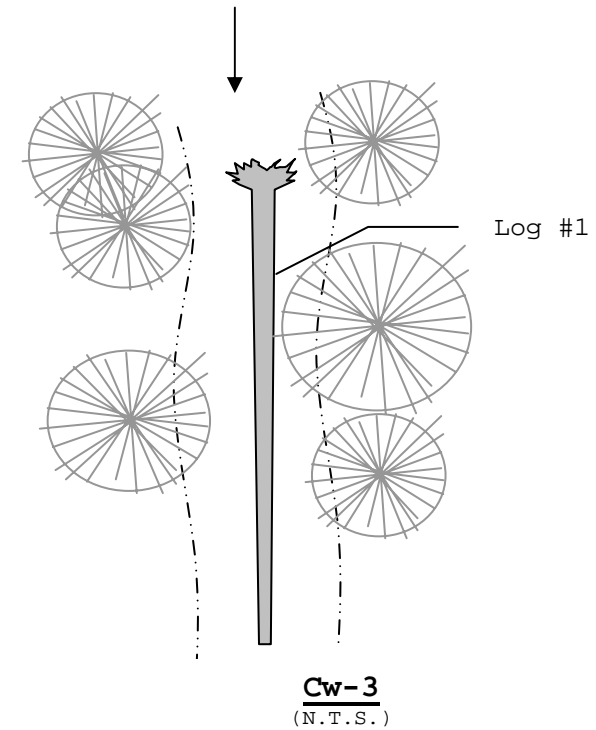
LWD: #1 = 50-ft x 14-24in DBH, #2 = 50-ft x 14-24-in DBH

Directions: Place RBs and logs in channel, random log orientation.



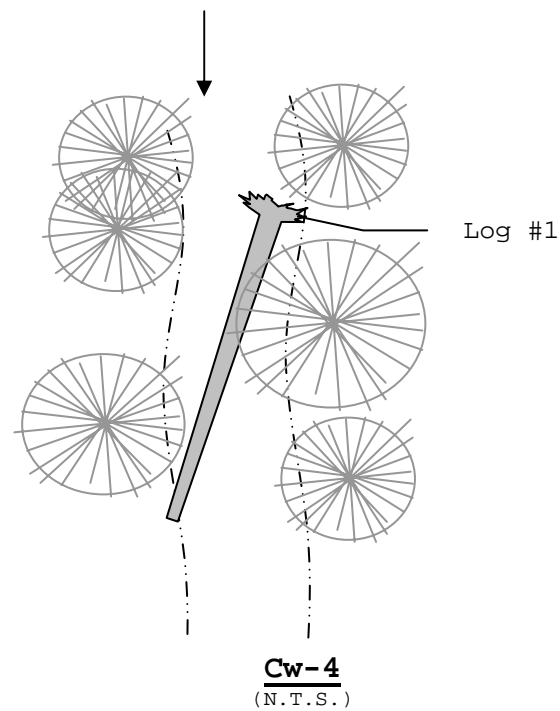
LWD: #1 = 10-ft stump

Directions: Place RB of stump such that stump sits upright in channel.



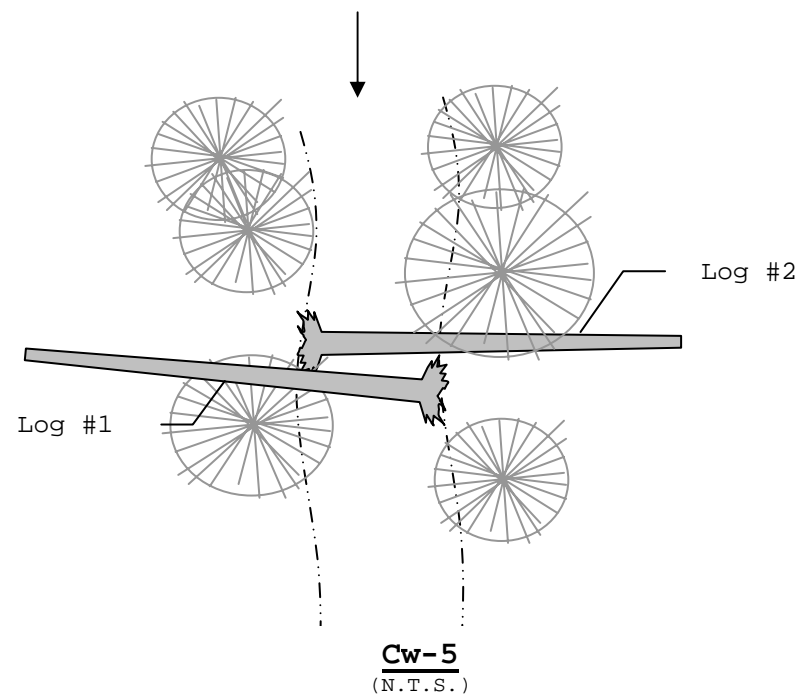
LWD: #1 = 50-ft x 14-24in DBH

Directions: Place RB in channel, random log orientation.



LWD: #1 = 50-ft x 20-24in DBH

Directions: Place RB and log in channel, random log orientation.



LWD: #1 = 50-ft x 14-24in DBH, #2 = 50-ft x 25-30in DBH

Directions: Place RBs in channel next to bank, logs to span channel as shown.

LEGEND	
	Existing large boulder
	Existing rapid
	Existing pool
	Existing gravel bar
	Stream bank
	Flow direction
	Existing LWD
	Existing tree on bank
	Proposed LWD placement

## COTTONWOOD CREEK HELICOPTER LWD PLACEMENT DETAILS

HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT  
PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT



U.S ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

DATE: 20-SEPT 2005

DESIGNED: Z. CORUM/S. POZARYCKI

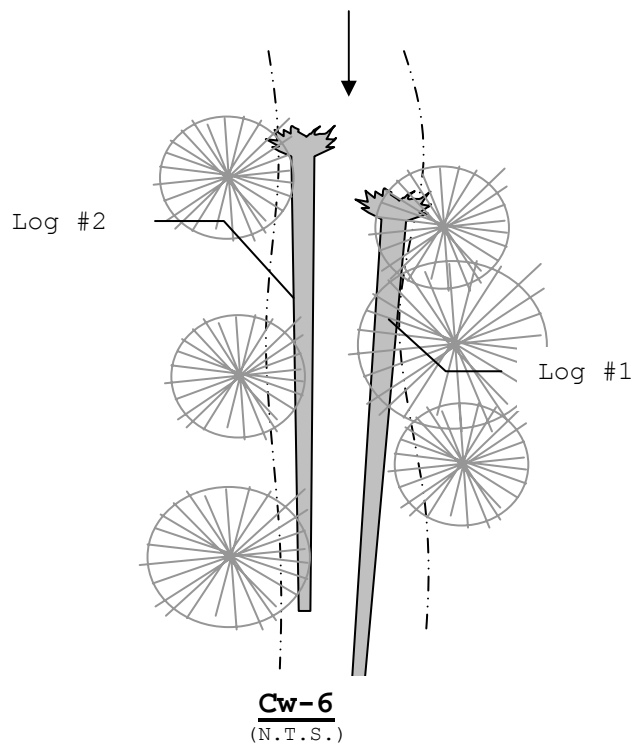
DRAWN: Z. CORUM

CHECKED:

Scale:  
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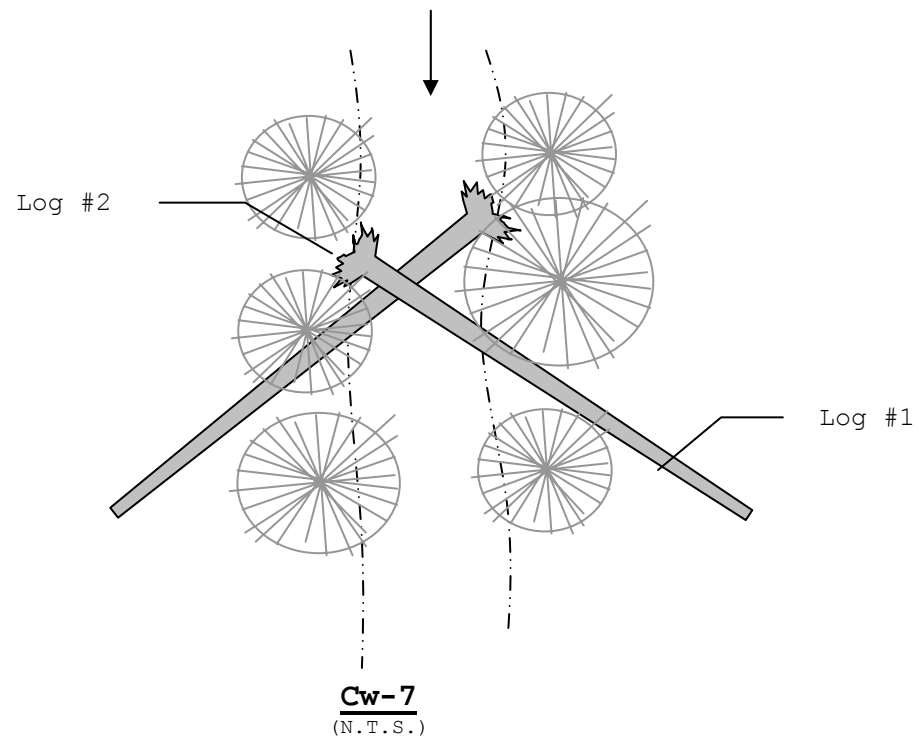
Plate #:  
**CW-2**

Sheet 5  
of 15



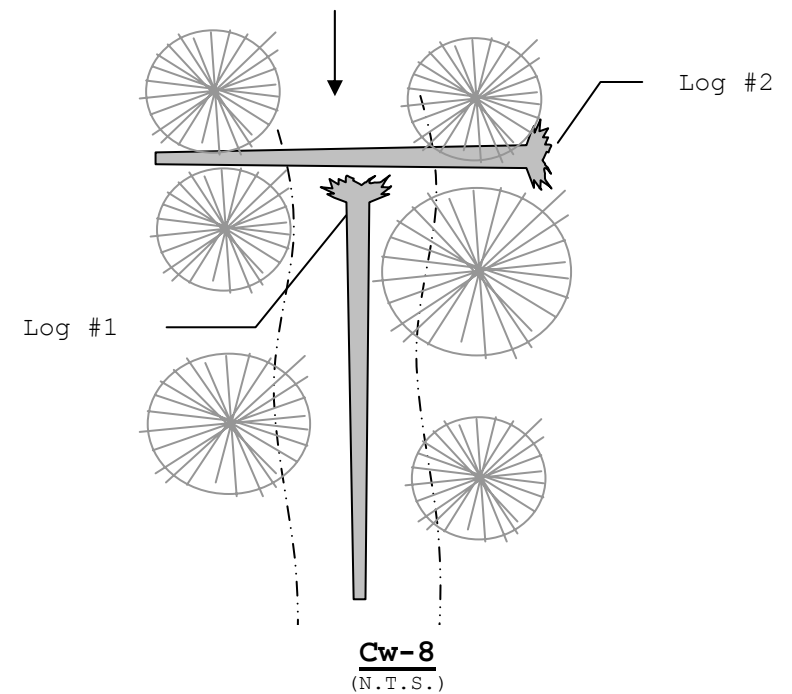
LWD: #1 = 50-ft x 14-24in DBH, #2 = 50-ft x 20-24-in DBH

Directions: Place RBs and logs in channel, || to flow, on opposite banks, || to flow, as shown.



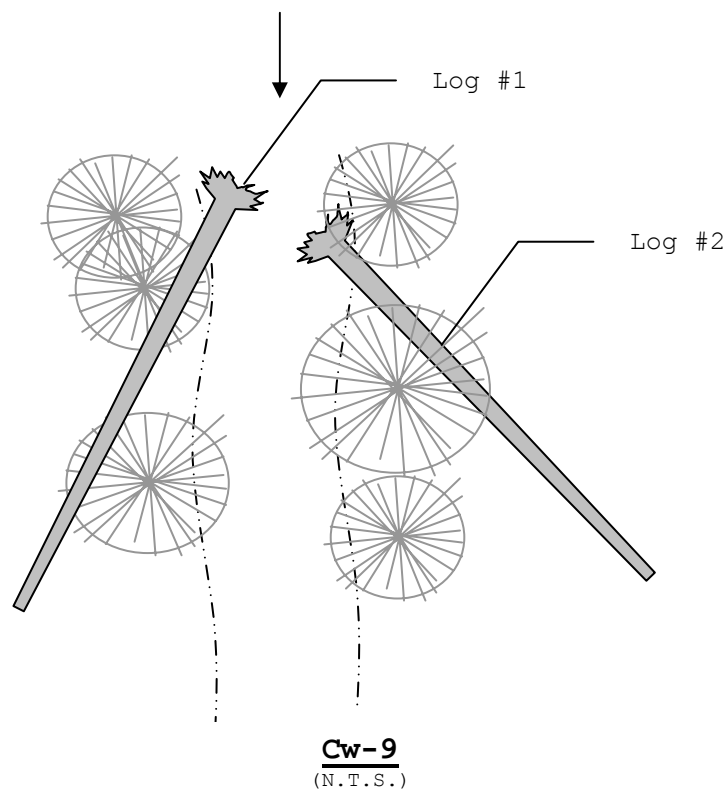
LWD: #1 = 50-ft x 14-24in DBH, #2 = 50-ft x 20-24-in DBH

Directions: Criss-cross logs, with RB facing upstream, on banks.



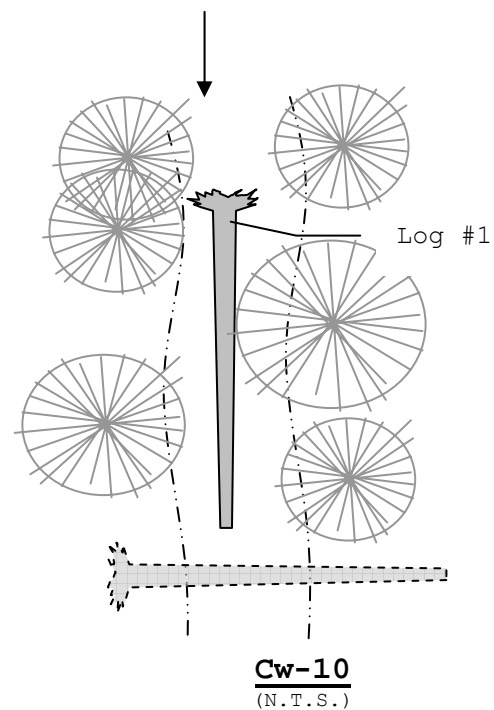
LWD: #1 = 50-ft x 20-24in DBH, #2 = 50-ft x 14-24in DBH

Directions: Place log # 1 in channel, || to flow with RB pointing upstream. Place log # 2 across channel upstream of log #1 as shown.



LWD: #1 = 50-ft x 14-24in DBH, #2 = 50-ft x 14-24in DBH

Directions: Place RB in channel, logs angled upstream such that RBs face eachother.



LWD: #1 = 50-ft x 25-30in DBH

Directions: Place RB and log in channel, || to flow upstream of existing LWD.

#### LEGEND

- Existing large boulder
- Existing rapid
- Existing pool
- Existing gravel bar
- Stream bank
- Flow direction
- Existing LWD
- Existing tree on bank
- Proposed LWD placement

#### COTTONWOOD CREEK HELICOPTER LWD PLACEMENT DETAILS

Scale:  
NO SCALE

HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT  
PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT

Plate #:  
**CW-3**



U.S ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

DATE: 20-SEPT 2005

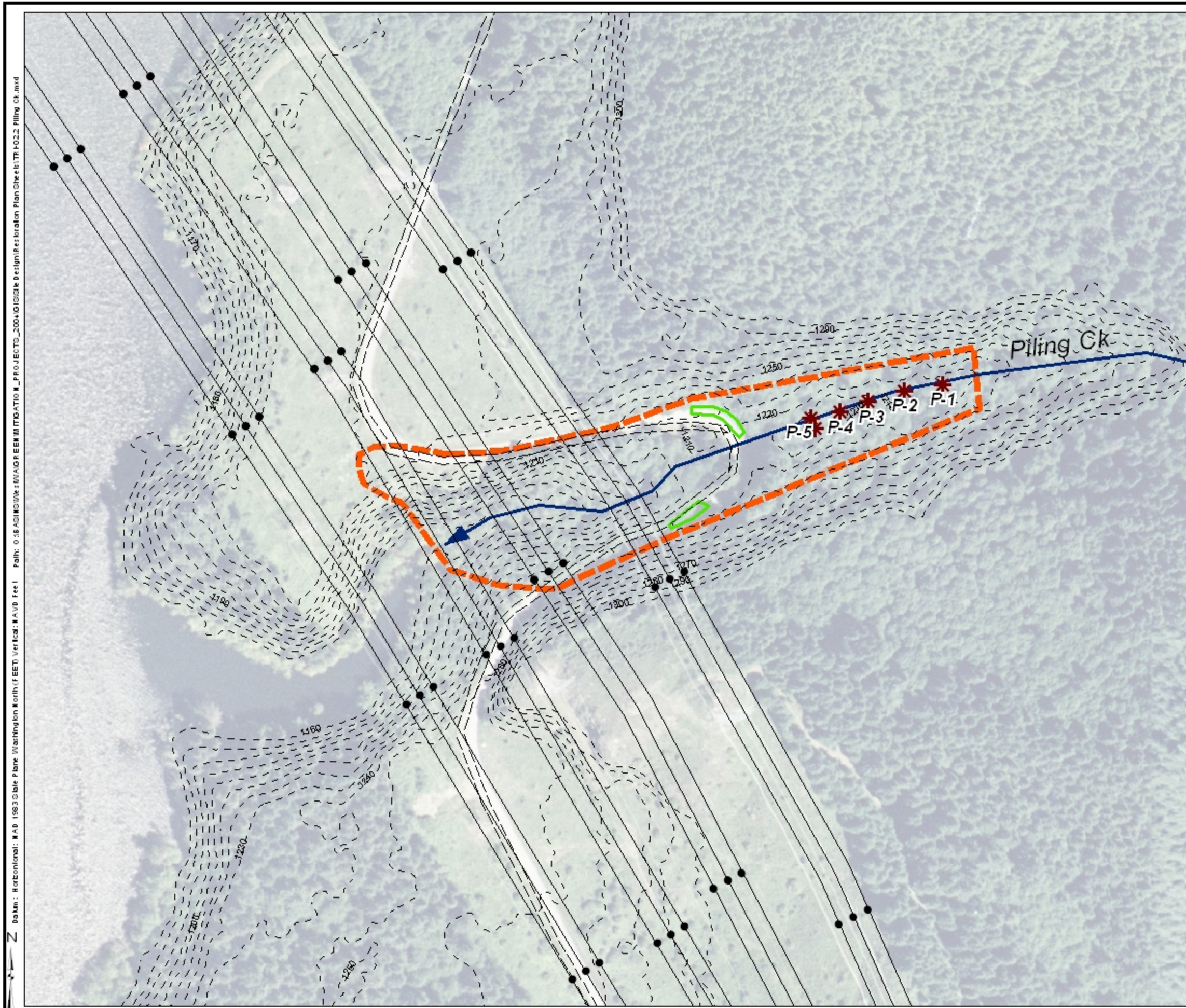
Sheet 6  
of 15

DESIGNED: Z. CORUM/S. POZARYCKI

DRAWN: Z. CORUM

CHECKED:





## Legend

- Work Limits
- KC Parcel Boundary
- Existing Road
- Staging Area
- Ordinary High Water Line
- Loose LWD
- Powerlines
- Ex. Ground Contours

### CONSTRUCTION NOTES:

- 1) Place LWD pieces individually, and in clusters, per sheet PI-2, and per USACE direction.
- 2) Actual LWD locations are flagged at ground level.
- 3) All LWD located at wellfield staging area.



TACOMA WATER, TACOMA  
PUBLIC UTILITIES  
City of Tacoma, WA



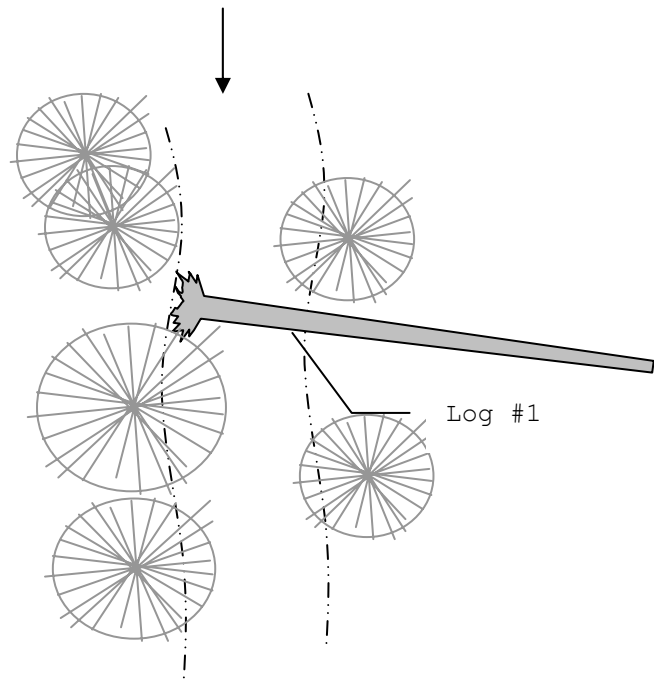
U. S. Army Engineer District, Seattle  
Corps of Engineers  
Seattle, Washington

2005 HOWARD HANSON DAM AWSP  
FISH HABITAT REHABILITATION

TRI-02.2 PILING CK  
RD 5500 MP 9.3, ELEV. 1177-1240  
KING COUNTY, WA

SIZE 11x17	FILE NAME TRI-02.2 Piling CK.mxd	DATE 20 SEPT 2005	PLATE PI-2
DSGN. Z. CORUM / S. POZARYCKI	CHK.	SHEET 7 OF 15	

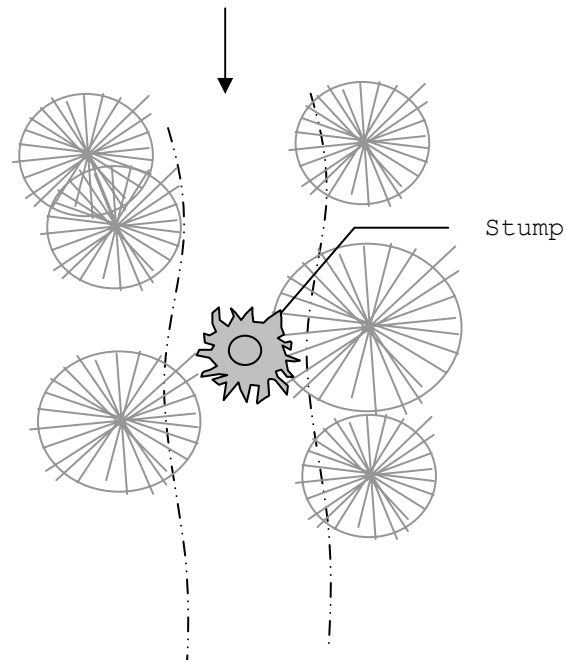




**P-1**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24in DBH

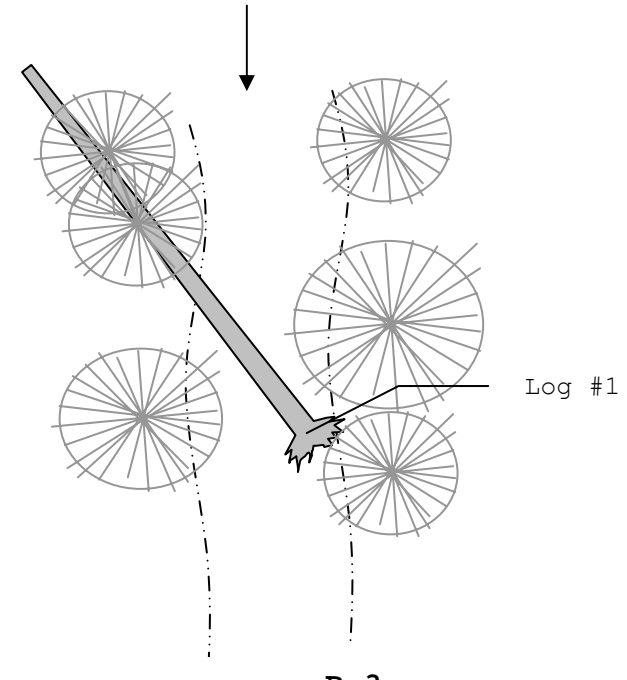
Directions: Place RB in channel, random log orientation.



**P-2**  
(N.T.S.)

LWD: #1 = 10-ft stump

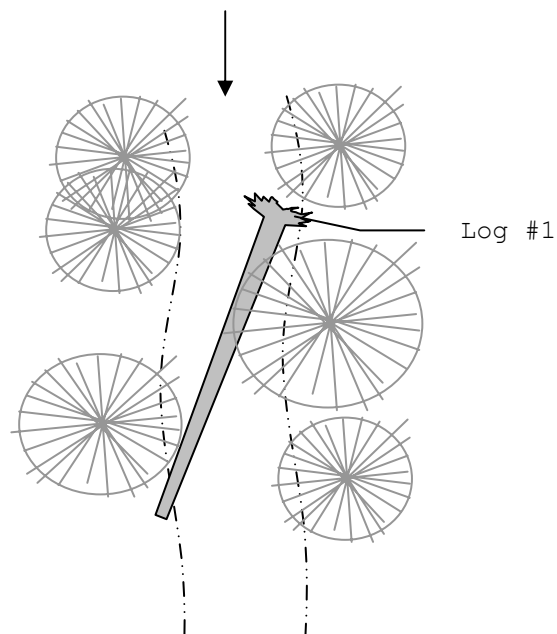
Directions: Place RB of stump such that stump sits upright in channel.



**P-3**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24in DBH

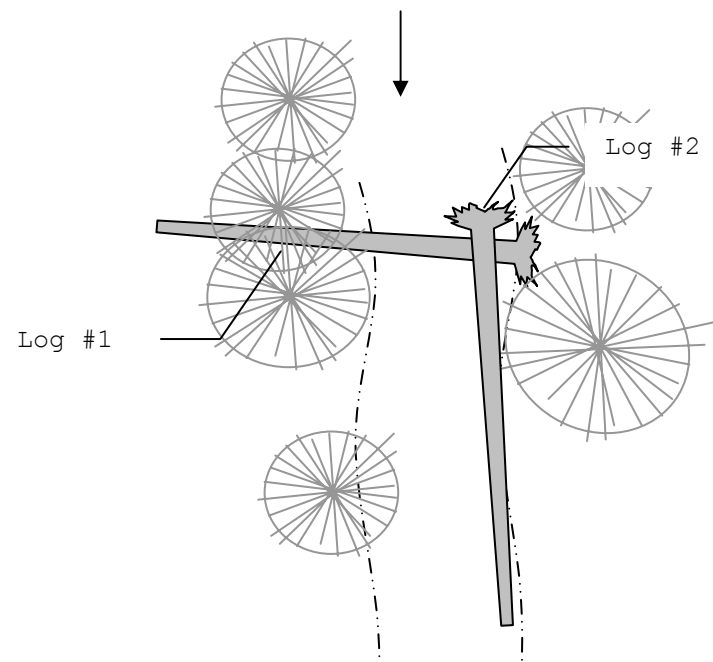
Directions: Place RB in channel, random log orientation.



**P-4**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24in DBH

Directions: Place RB and log in channel, random log orientation.



**P-5**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30in DBH, #2 = 50-ft x 25-30in DBH

Directions: Log #1 placed across channel  $\perp$  to flow. Log #2 placed on top of Log #1,  $\parallel$  to flow with RB pointing upstream.

**LEGEND**

- Existing large boulder
- Existing rapid
- Existing pool
- Existing gravel bar
- Stream bank
- Flow direction
- Existing LWD
- Existing tree on bank
- Proposed LWD placement

**PILING CREEK HELICOPTER LWD PLACEMENT DETAILS**

HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT  
PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT



U.S. ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

DATE: 20-SEPT 2005

DESIGNED: Z. CORUM/S. POZARYCKI

DRAWN: Z. CORUM

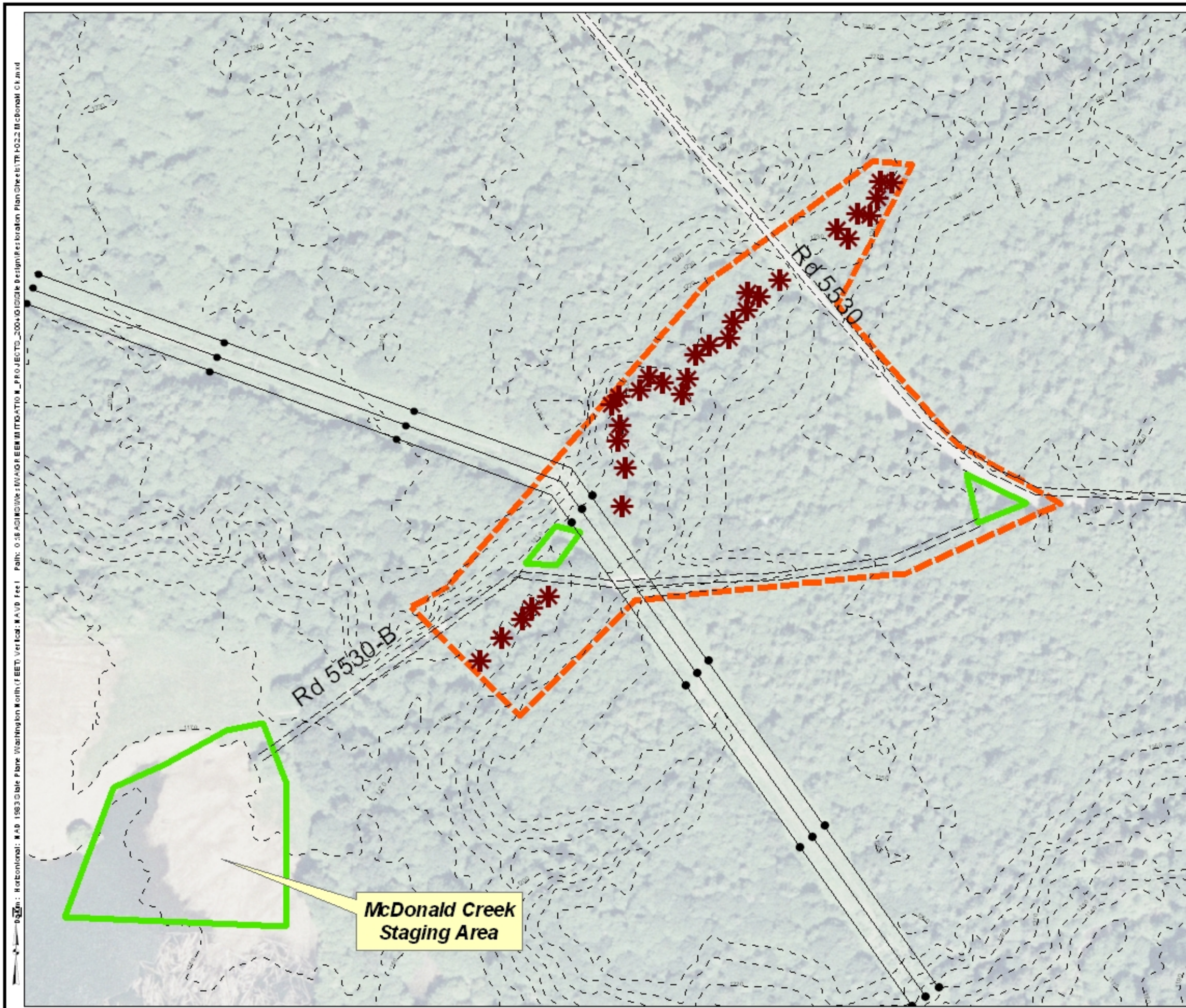
CHECKED:

Scale:  
NO SCALE

Plate #:  
**PI-2**

Sheet 8  
of 15





# Legend

- Work Limits
- KC Parcel Boundary
- Existing Road
- Staging Area
- River Mile
- Ordinary High Water Line
- Loose LWD
- Ex. Ground Contours
- Powerlines

## CONSTRUCTION NOTES:

- 1) Place LWD pieces individually, and in clusters, such that root balls are in channel. Orientation of logs is random.
- 2) LWD should be randomly placed along channel length.
- 3) All LWD located at staging areas indicated on drawing. Government will move LWD between staging areas if necessary to avoid powerlines.



TACOMA WATER, TACOMA  
PUBLIC UTILITIES  
City of Tacoma, WA



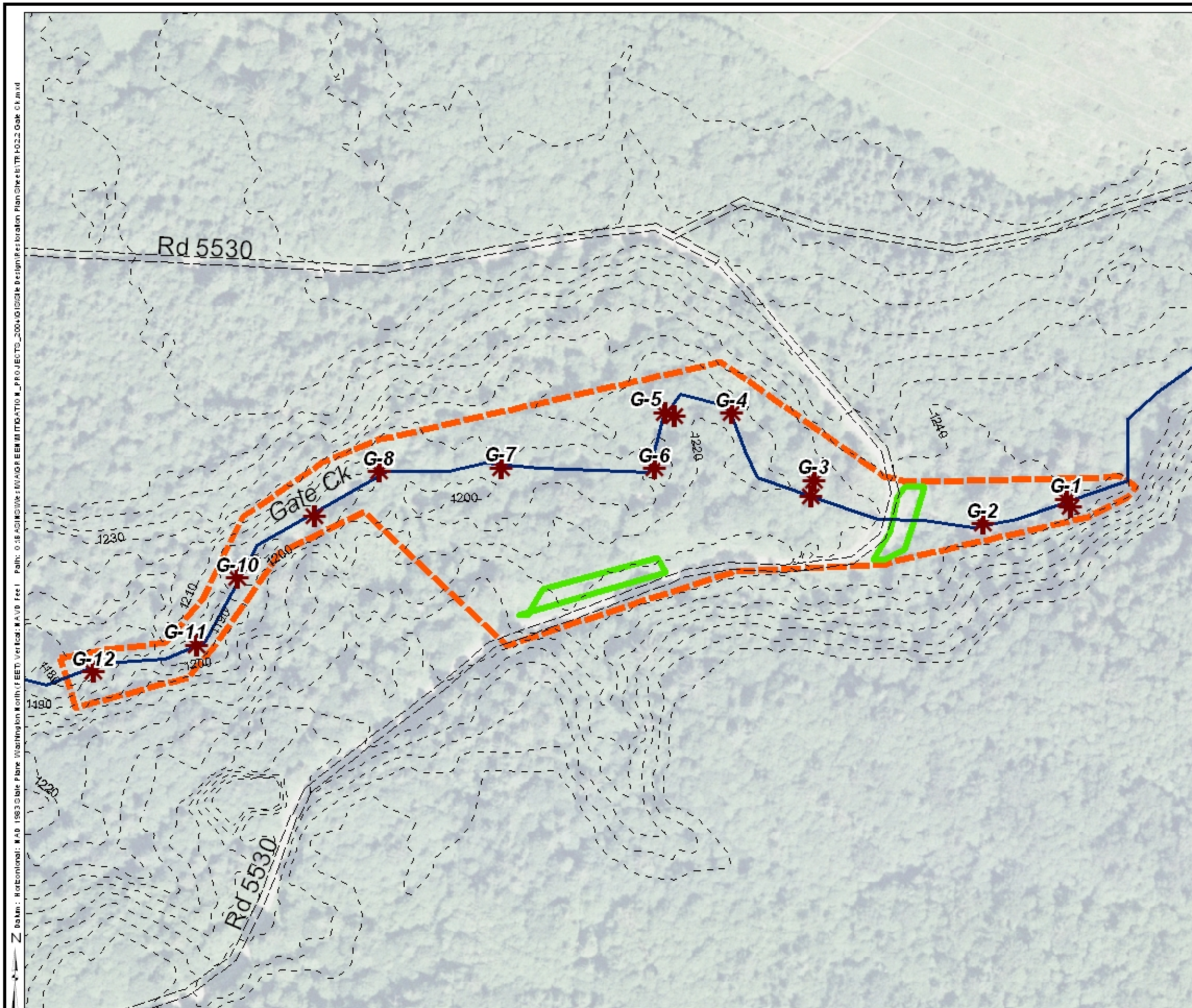
U. S. Army Engineer District, Seattle  
Corps of Engineers  
Seattle, Washington

2005 HOWARD HANSON DAM AWSP  
FISH HABITAT REHABILITATION

TRI-02.2 UPPER McDONALD CK RD 5530-B  
ELEV. 1177-1240  
KING COUNTY, WA

SCE 11x17	FILE NAME TRI-02.2 McDonald CK.mxd	DATE 28 SEPT 2005	PLATE MC-1
DSGN.	Z. CORUM / S. POZARYCKI	CHK.	SHEET 9 OF 15





# Legend

- Work Limits
- KC Parcel Boundary
- Existing Road
- Staging Area
- River Mile
- Ordinary High Water Line
- Loose LWD
- Ex. Ground Contours

## CONSTRUCTION NOTES:

- 1) Place LWD pieces individually, and in clusters, per sheet GL-2 and GL-3, and per USACE direction.
- 2) Actual LWD locations are flagged at ground level.
- 3) All LWD located at staging areas indicated on drawing.



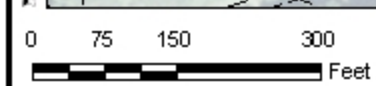
TACOMA WATER, TACOMA  
PUBLIC UTILITIES  
City of Tacoma, WA



U. S. Army Engineer District, Seattle  
Corps of Engineers  
Seattle, Washington

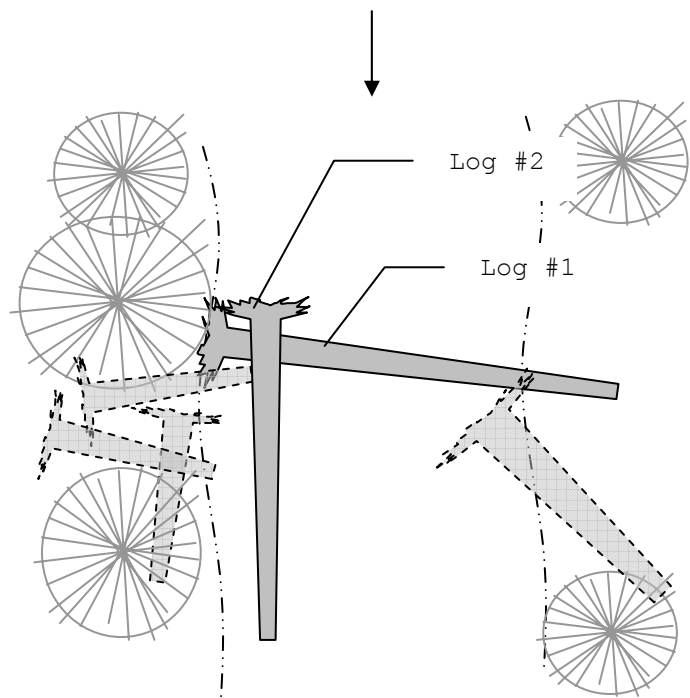
2005 HOWARD HANSON DAM AWSP  
FISH HABITAT REHABILITATION

TRI-02.2 GALE CK RD 5530 MP 11.9  
ELEV. 1177-1240  
KING COUNTY, WA



SEE 11x17	FILE NAME TRI-02.2 Gale Ck.mxd	DATE 28 SEPT 2005	PLATE GL-1
DSGN. Z. CORUM / S. POZARYCKI	CHK.	SHEET 10 OF 15	

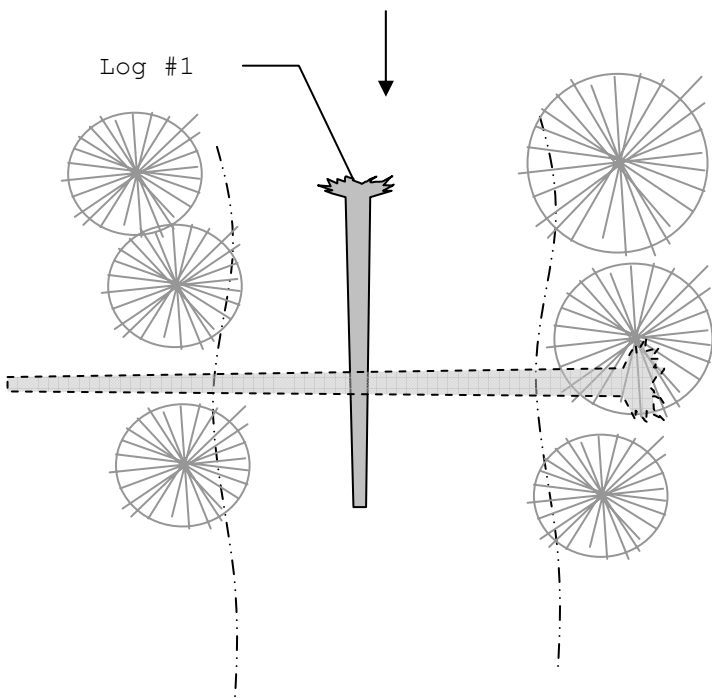




**G-1**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH, #2 = 50-ft x 25-30-in DBH

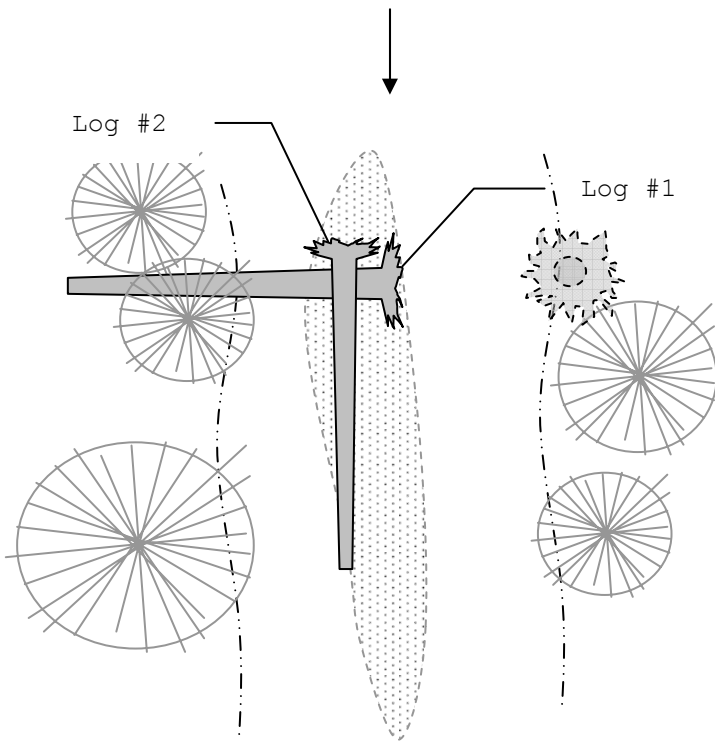
Directions: Log #1 placed across channel  $\perp$  to flow. Log #2 placed on top of Log #1,  $\parallel$  to flow with RB pointing upstream. Place logs adjacent to existing LWD to secure logs.



**G-2**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

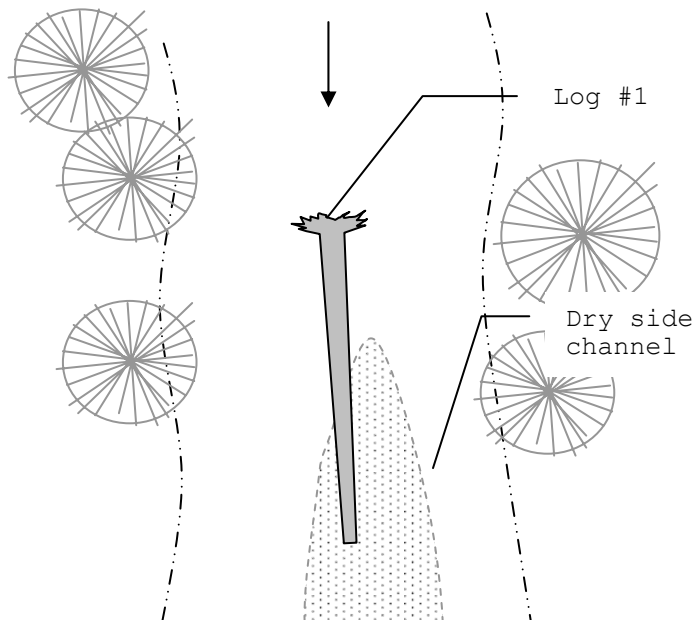
Directions: Log #1 placed  $\parallel$  to flow with RB pointing upstream. Slide tip of log under large existing LWD as far as possible.



**G-3**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH, #2 = 50-ft x 25-30-in DBH

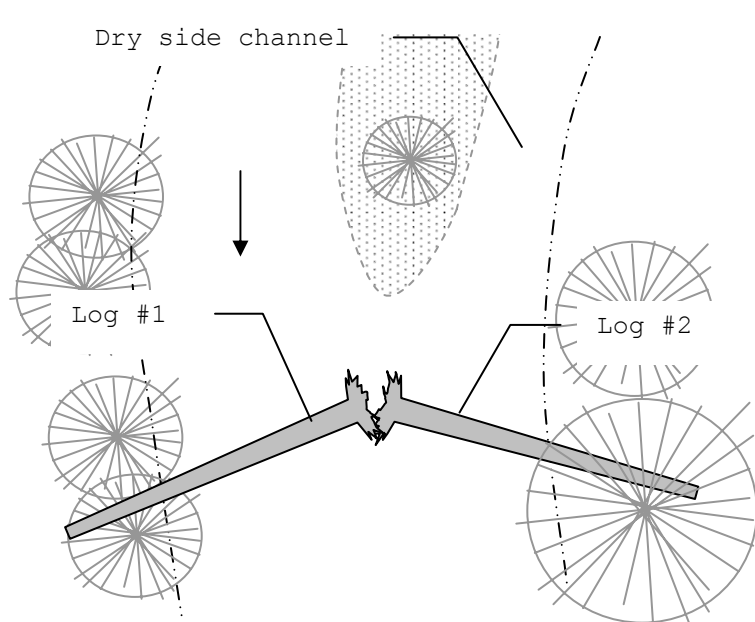
Directions: Log #1 placed across channel  $\perp$  to flow, across from existing RB, on mid-channel gravel bar. Log #1 tip resting against alder tree on bank. Log #2 placed on top of Log #1 as shown.



**G-4**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

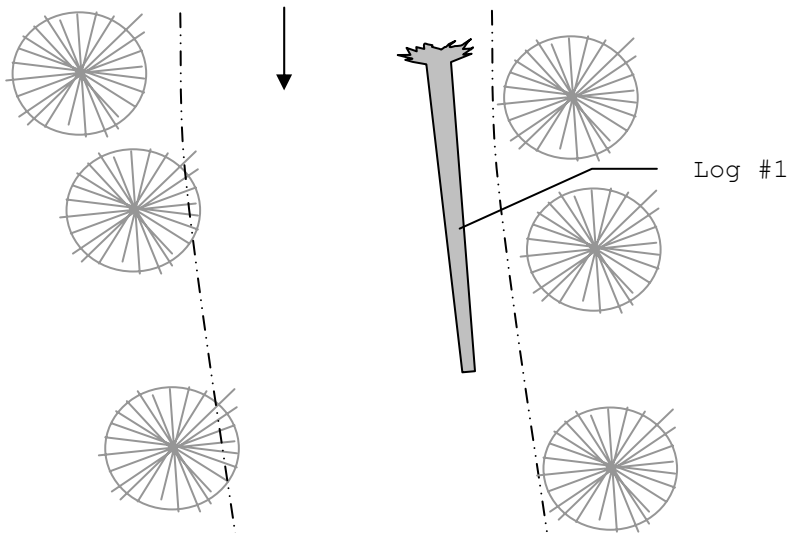
Directions: Place log #1 on top of gravel bar as indicated,  $\parallel$  to flow with RB pointing upstream.



**G-5**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH, #2 = 50-ft x 25-30-in DBH

Directions: Place RBs in middle of channel. Angle logs upstream to flow. Rest log tips against trees on bank.



**G-6**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH

Directions: Place log  $\parallel$  to flow with RB pointing upstream, next to bank.

**LEGEND**

- Existing large boulder
- Existing rapid
- Existing pool
- Existing gravel bar
- Stream bank
- Flow direction
- Existing LWD
- Existing tree on bank
- Proposed LWD placement

**GALE CREEK HELICOPTER LWD PLACEMENT DETAILS**

Scale:

NO SCALE

HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT  
PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT

Plate #:

**GL-2**



U.S. ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

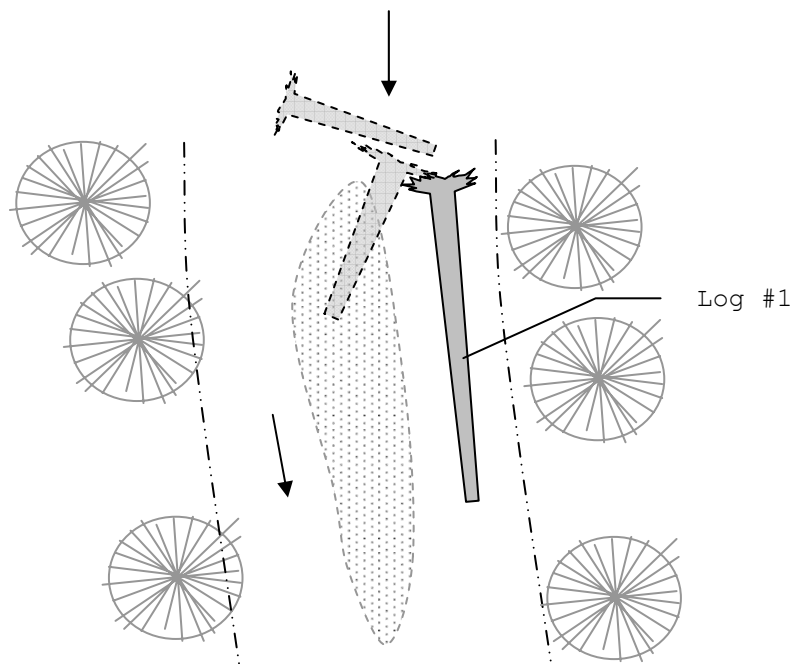
DATE: 20-SEPT 2005

DESIGNED: Z. CORUM/S. POZARYCKI

DRAWN: Z. CORUM

CHECKED:

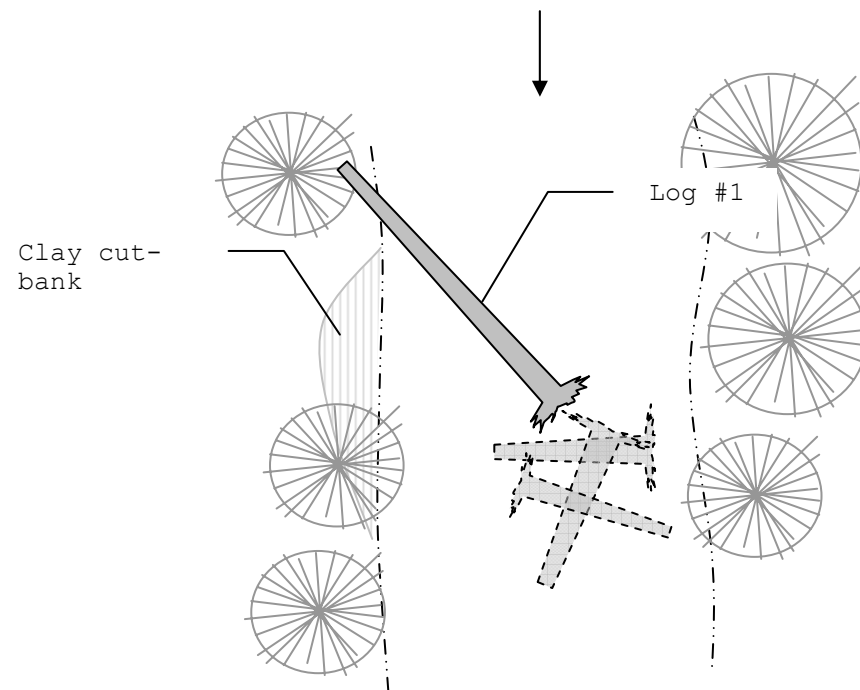
Sheet 11  
of 15



**G-7**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH

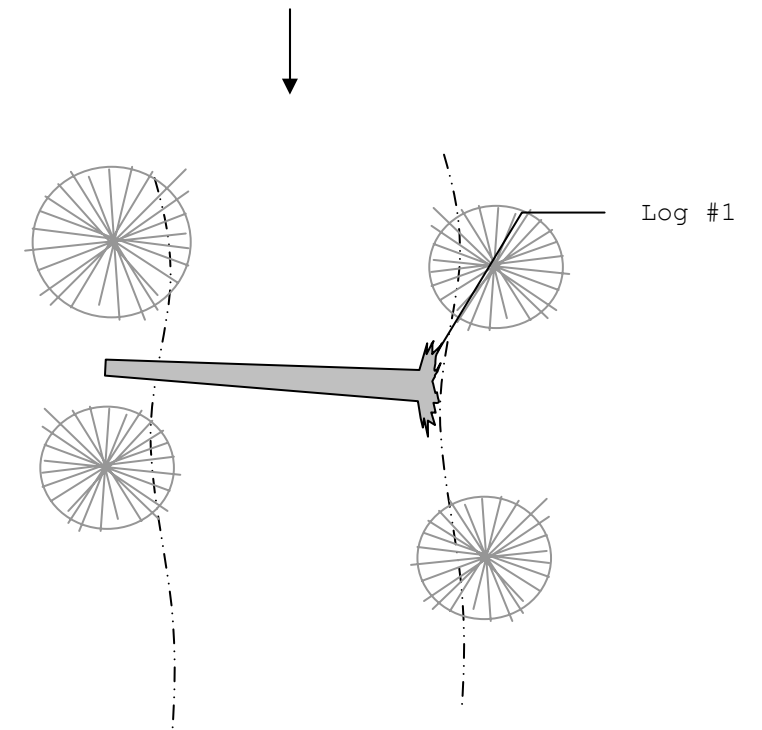
Directions: Place log || to flow with RB pointing upstream, next to existing LWD.



**G-8**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

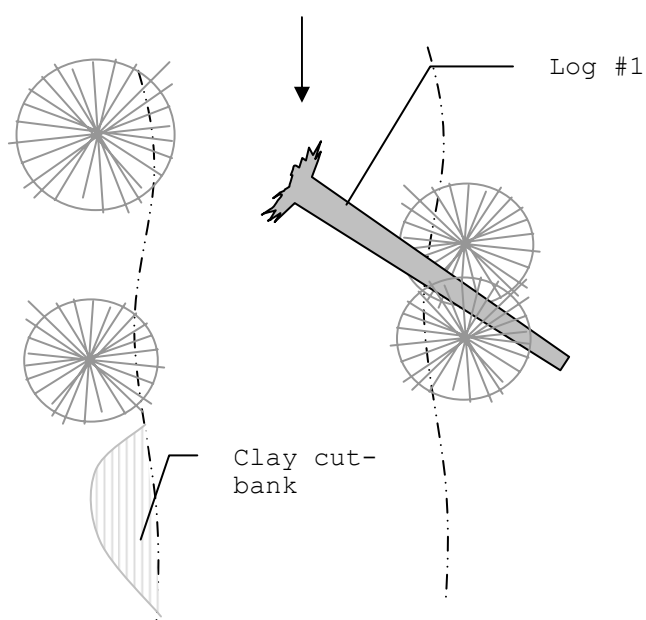
Directions: Place Log#1 between existing LWD and streambank, RB facing downstream.



**G-9**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

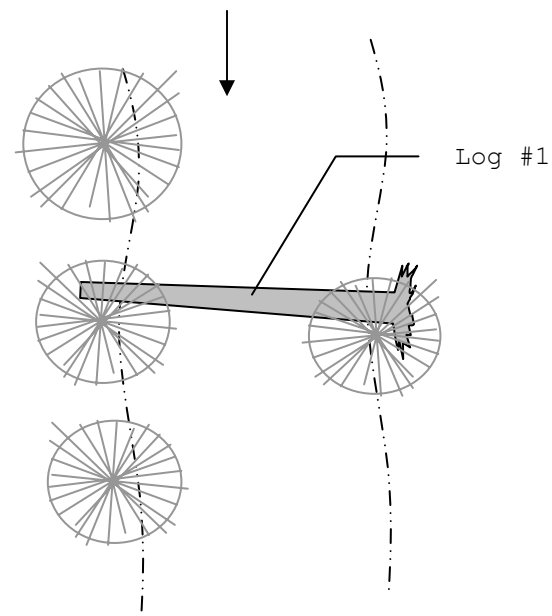
Directions: Log #1 placed across channel, ⊥ to flow, RB in channel.



**G-10**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH,

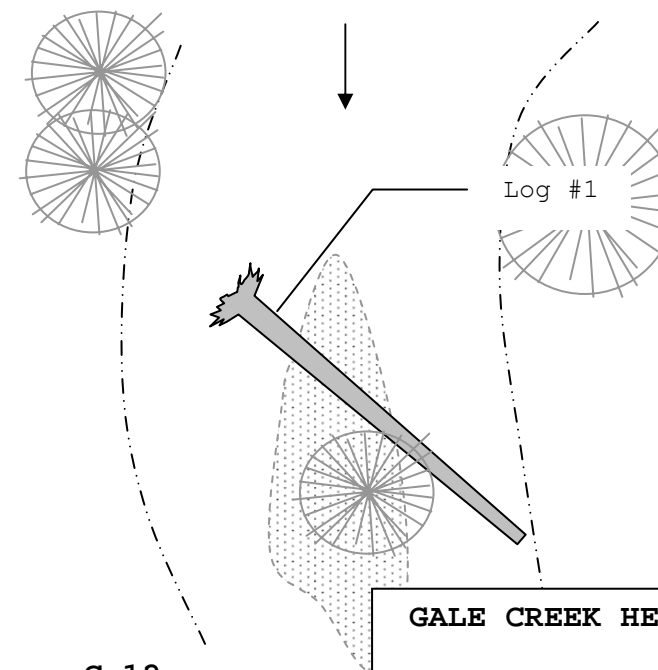
Directions: Log #1 angled upstream to flow, RB in channel, tip of log between alders.



**G-11**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

Directions: Log #1 placed across channel, ⊥ to flow, RB in channel, tip and RB of log against alders.



**G-12**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH

Directions: Place RB in channel, angle log upstream to flow.

**LEGEND**

- Existing large boulder
- Existing rapid
- Existing pool
- Existing gravel bar
- Stream bank
- Flow direction
- Existing LWD
- Existing tree on bank
- Proposed LWD placement

**GALE CREEK HELICOPTER LWD PLACEMENT DETAILS**

HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT  
PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT



U.S. ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

DATE: 20-SEPT 2005

DESIGNED: Z. CORUM/S. POZARYCKI

DRAWN: Z. CORUM

CHECKED:

Scale:

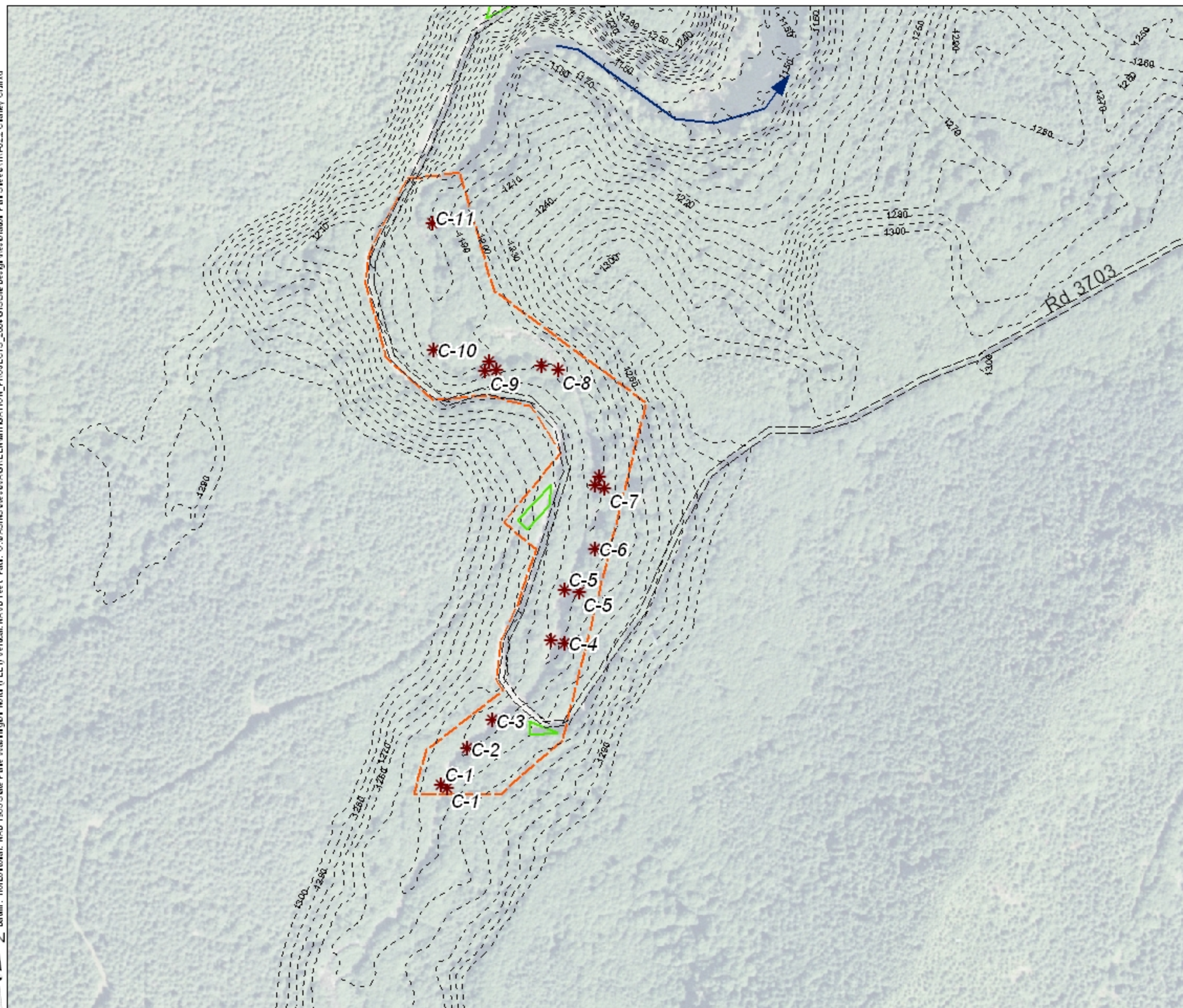
NO SCALE

Plate #:

**GL-3**

Sheet 12  
of 15





### Legend

-  Work Limits
-  KC Parcel Boundary
-  Existing Road
-  Staging Area
-  Ordinary High Water Line
-  Loose LWD
-  Ex. Ground Contours

CONSTRUCTION NOTES:

- 1) Place LWD pieces individually, and in clusters, per sheet CH-2 and CH-3, and per USACE direction.
- 2) Actual LWD locations are flagged at ground level.
- 3) All LWD located at staging areas on drawing.



TACOMA WATER, TACOMA  
PUBLIC UTILITIES  
City of Tacoma, WA



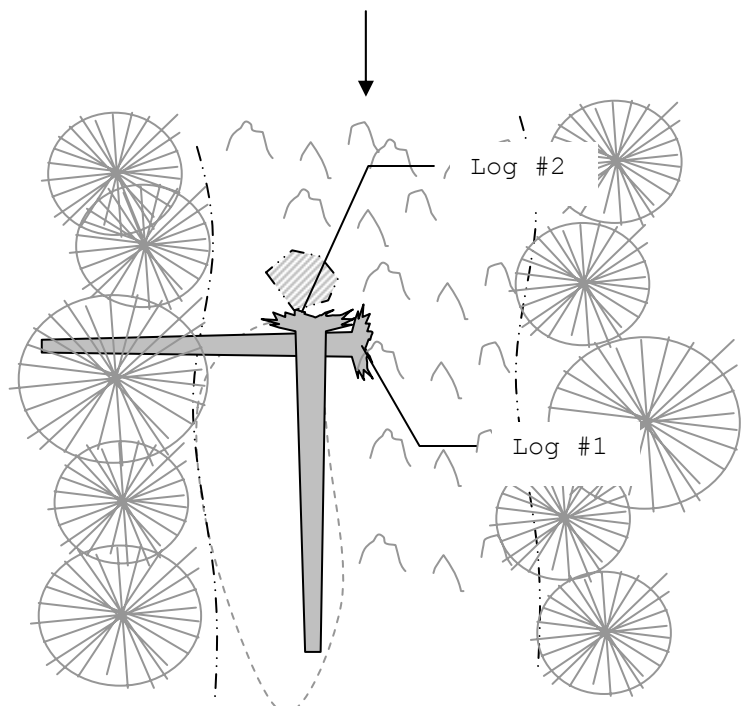
U. S. Army Engineer District, Seattle  
Corps of Engineers  
Seattle, Washington

2005 HOWARD HANSON DAM AWSP  
FISH HABITAT REHABILITATION

TRI-02.2 CHARLEY CREEK  
RD 3703 MP 16, ELEV. 1177-1240  
KING COUNTY, WA

SEE 11x17	FILE NAME TRI022 Clarity Cl.mxd	DATE 20 SEPT 2005	PLATE CH-1
DSGN.	Z CORUM / S. POZARYCKI	CHK.	SHEET 13 OF 15

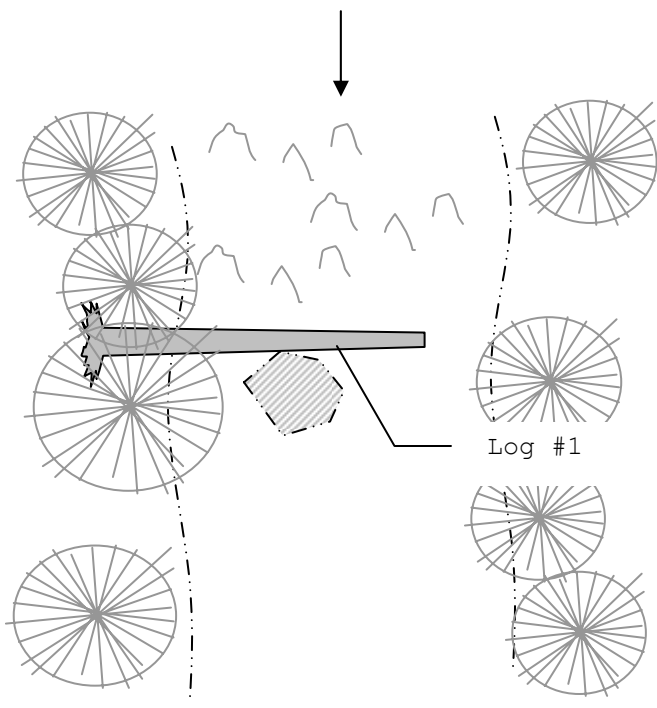




**C-1**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH, #2 = 50-ft x 25-30-in DBH

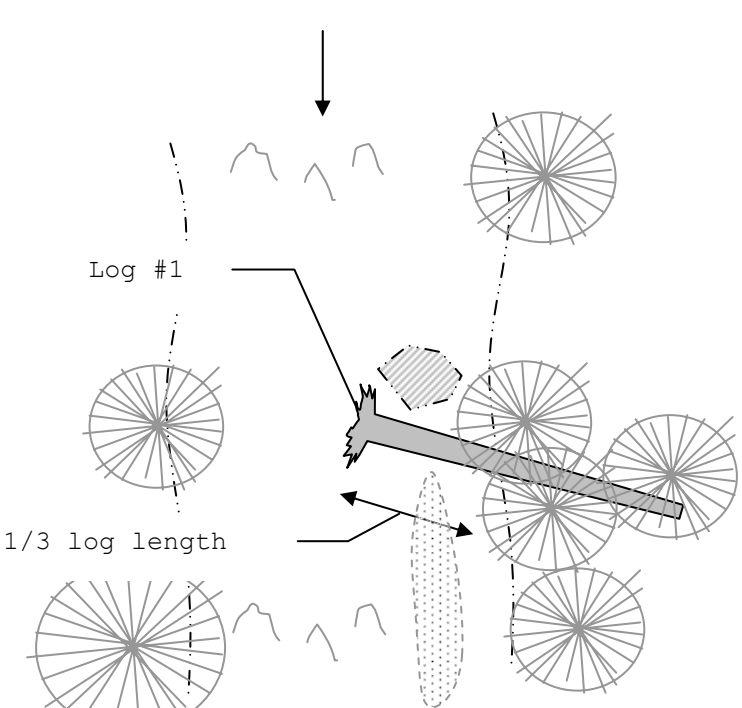
Directions: Log #1 placed between alders on bank and below boulder, in channel,  $\perp$  to flow. Log #2 placed on top of Log #1 as shown, behind boulder,  $\parallel$  to flow.



**C-2**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

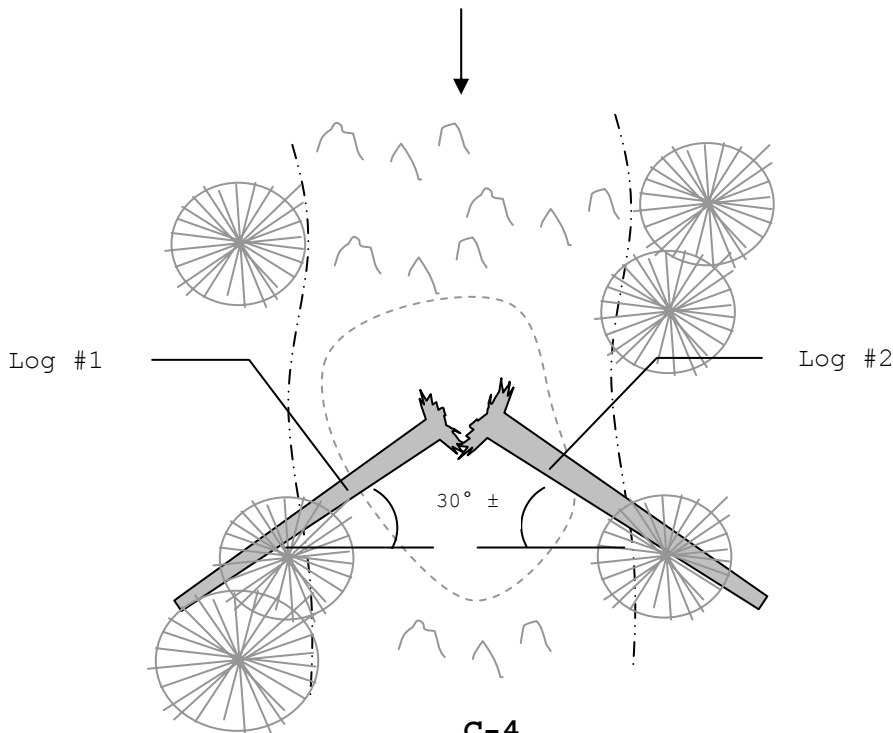
Directions: Log #1 placed  $\perp$  to flow between alders on bank and boulder. RB of log placed between trees, stem of log positioned against upstream face of boulder, in channel.



**C-3**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

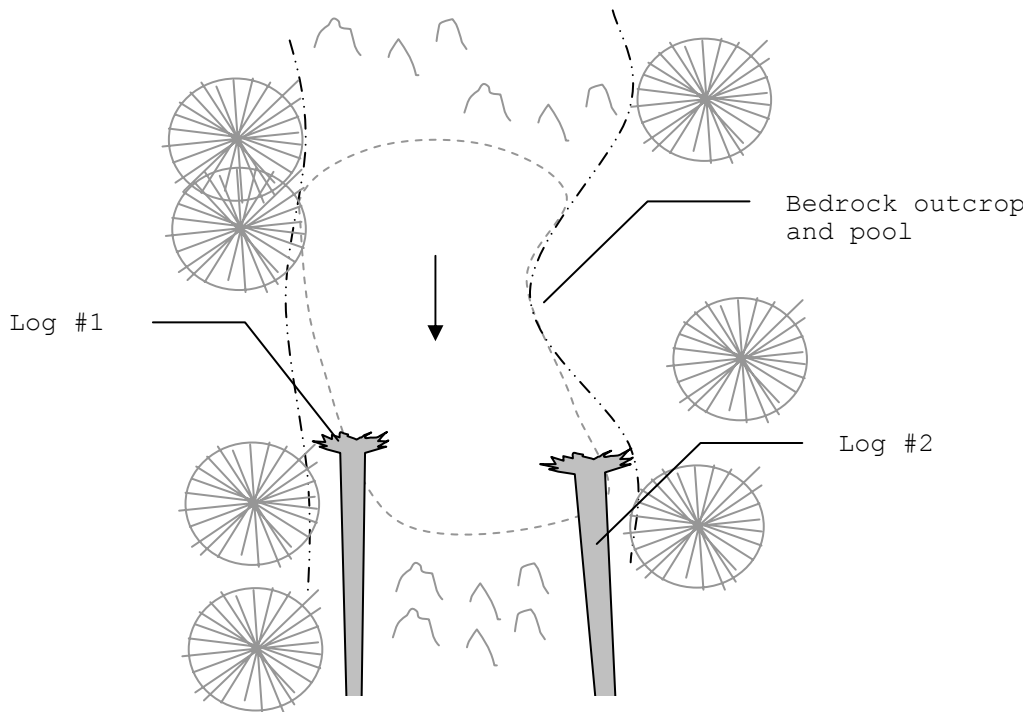
Directions: 2/3 of Log #1 placed between alders on bank, 1/3 of log, incl. RB, in channel, below boulder.



**C-4**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH, #2 = 50-ft x 25-30-in DBH

Directions: Logs and RBs point upstream and meet in center of channel. Logs form a 30° angle with banks. Use alders on bank to support logs if possible.



**C-5**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH, #2 = 50-ft x 25-30-in DBH

Directions: Logs placed  $\parallel$  to flow with RBs pointing upstream, in channel on either side of pool downstream of bedrock outcrop.

**LEGEND**

- Existing large boulder
- Existing rapid
- Existing pool
- Existing gravel bar
- Stream bank
- Flow direction
- Existing LWD
- Existing tree on bank
- Proposed LWD placement

**CHARLEY CREEK HELICOPTER LWD PLACEMENT  
DETAILS**

Scale:  
NO SCALE

HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT  
PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT

Plate #:  
**CH-2**



U.S ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

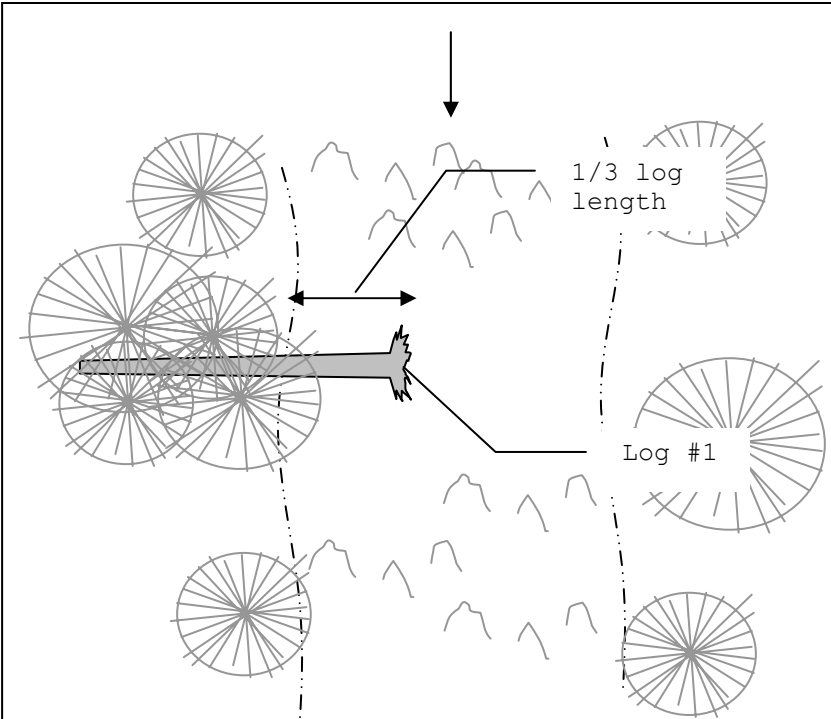
DATE: 20-SEPT 2005

Sheet 14  
of 15

DESIGNED: Z. CORUM/S. POZARYCKI

DRAWN: Z. CORUM

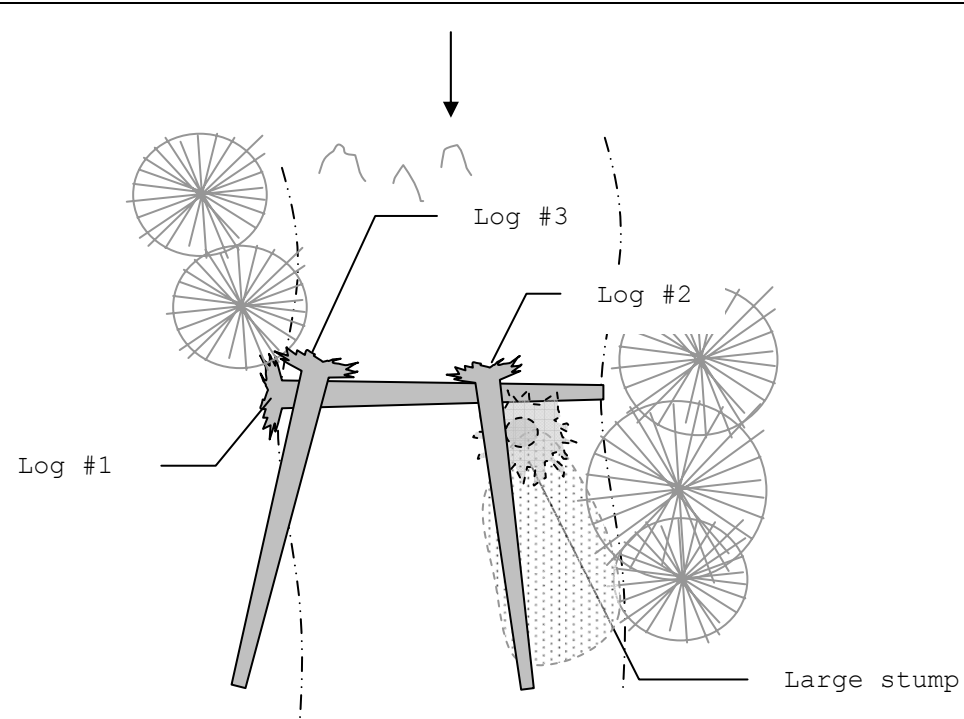
CHECKED:



**C-6**  
(N.T.S.)

LWD: #1 = 50-ft x 20-24-in DBH

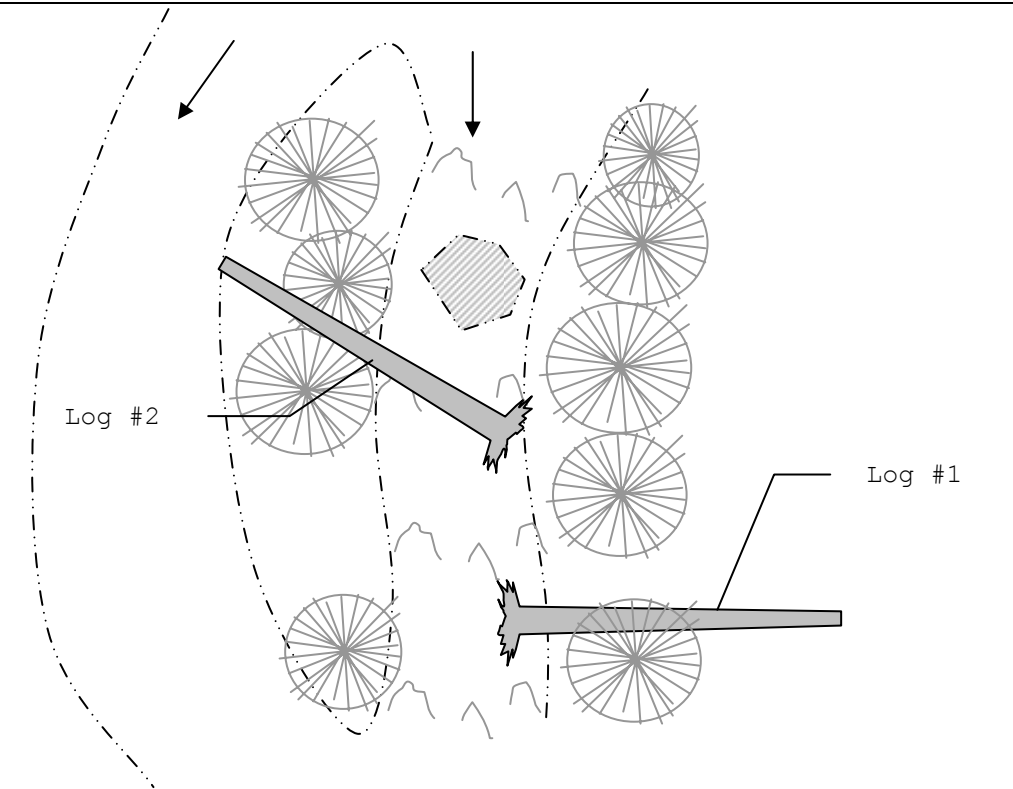
Directions: Log #1 placed between alders on bank, RB in channel,  $\perp$  to flow.



**C-7**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH, #2 = 50-ft x 20-24-in DBH, #3 = 50-ft x 25-30-in DBH

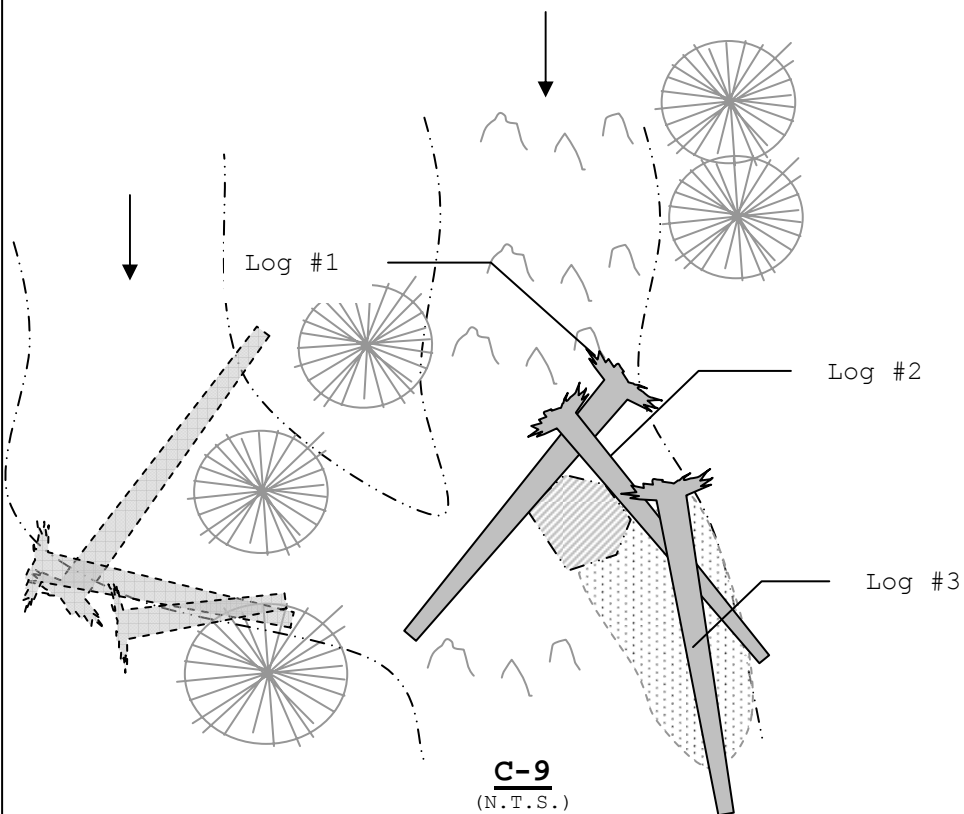
Directions: Log #1 placed  $\perp$  to flow between alders on bank and old stump. Log #2 placed on top of log #1,  $\parallel$  to flow with RB pointing upstream. Log #3 placed  $\parallel$  to flow on top of Log #1.



**C-8**  
(N.T.S.)

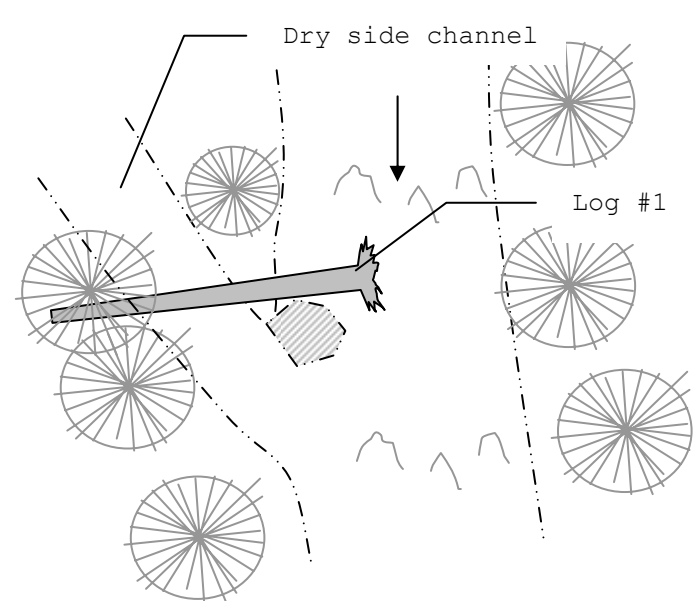
LWD: #1 = 50-ft x 20-24-in DBH, #2 = 50-ft x 20-24-in DBH

Directions: Log #2 placed randomly in channel between Log #1 and large boulder. Log #1 RB placed in channel, stem on bank, near confluence of side channels.



**C-9**  
(N.T.S.)

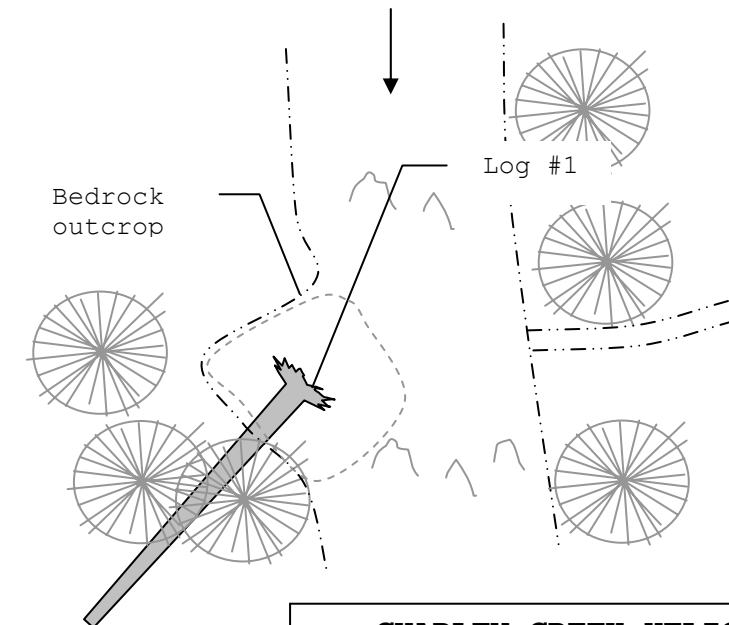
LWD: #1 = 50-ft x 25-30-in DBH, #2 = 50-ft x 20-24-in DBH, #3 = 50-ft x 20-24-in DBH  
Directions: Use existing boulder and place logs such that Logs #1 and #2 are in contact with boulder and Log #2 is pinning #1, and #3 is pinning #2.



**C-10**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

Directions: Place RB in channel. Use in-channel boulder and alders on bank to hold log in place



**C-11**  
(N.T.S.)

LWD: #1 = 50-ft x 25-30-in DBH

Directions: Place RB in pool downstream of bedrock outcrop. Position stem to rest against alders and bank.

**LEGEND**

- Existing large boulder
- Existing rapid
- Existing pool
- Existing gravel bar
- Stream bank
- Flow direction
- Existing LWD
- Existing tree on bank
- Proposed LWD placement

**CHARLEY CREEK HELICOPTER LWD PLACEMENT DETAILS**

HOWARD HANSON ADDITIONAL WATER STORAGE PROJECT  
PHASE-1 FISH AND WILDLIFE RESTORATION PROJECT



U.S ARMY CORPS OF ENGINEERS  
SEATTLE DISTRICT

DATE: 20-SEPT 2005

DESIGNED: Z. CORUM/S. POZARYCKI

DRAWN: Z. CORUM

CHECKED:

Scale:

NO SCALE

Plate #:

**CH-3**

Sheet 15  
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